# Towards an understanding of competing constructions of risk for Impact Assessment

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By Kirsten D. Day

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Primary Supervisor: Associate Professor Zarina Patel
Second Supervisor: Professor Hanna-Andrea Rother

## Declaration

I declare that this thesis is my own work in both concept and execution.

Signed by candidate

Kirsten Day

## Abstract

Since the inception of the Impact Assessment (IA) tool in the late 1960s, a pivotal role has been assigned to science and expert knowledge, in a rational scientific approach to anticipating the environmental effects of proposed projects. Embedded in this philosophy is a realist interpretation of risk, such that measurable properties are allocated that can be determined based on probabilities. The intention is to reduce uncertainty and improve the accuracy of forecasting. Whilst this approach adds value to IA, it has limitations in respect of the human dimensions of risk which influence the process and outcomes of the assessment. This research responds to this problem with an exploration into competing constructions of risk for the IA discipline.

I begin this thesis by highlighting how IA has been affected by the passage of risk, over several decades, from the domain of science to a wider public discourse linked to fear and anxiety about living in a "Runaway World" (Giddens, 2002). Relevant in this context, are espoused sustainability principles for IA relating to inclusivity and equity. Underscored by numerous critics are associated challenges, particularly when it comes to incorporating social values and acknowledging the role of power in IA. I propose that these challenges can be linked to interpretations of risk - realist on one hand, and societal, cultural and cognitive on the other.

The approach to uncovering the implications of competing constructions of risk for IA relies on the method of critical discourse analysis (CDA), and a Foucauldian notion of discourse linked to power. I describe three distinct theories focusing on the social, psychological, and cultural dimensions of risk. These include risk society theory, the psychometric paradigm and cultural theory. To demonstrate their relevance, each theory is applied in a discourse analysis of three South African case studies: a specialist study for a fuel storage facility, an environmental impact assessment (EIA) for a nuclear power plant, and a strategic environmental assessment (SEA) for proposed hydrofracking for shale gas in the Karoo. The studies highlight limitations to the realist interpretation of risk, particularly in morally and politically contested circumstances.

My argument is for a richer understanding of risk for IA, along a continuum which accommodates pluralism. I conclude that alternative risk theories provide deeper insight into social values and power dynamics, with a view to advancing the IA discipline to meet the challenges posed by increasing levels of uncertainty in an ever-changing world.

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# Abbreviations

| | |
|---|---|
| AIA: | Approved Inspection Authority |
| BST: | Black Swan Theory |
| CBO: | Community-based Organisation |
| CDA: | Critical Discourse Analysis |
| CSIR: | Council for Scientific and Industrial Research |
| DEAT: | Department of Environmental Affairs and Tourism (this Department has had different titles over the last two decades and is currently the Department of Forestry, Fisheries and the Environment – text citations are according to the title at the time documents were produced, or otherwise I have referred to the Department responsible for Environmental Affairs) |
| DoE: | Department of Energy |
| DoL: | Department of Labour |
| EAP: | Environmental Assessment Practitioner |
| EAPASA: | Environmental Assessment Practitioners Association of South Africa |
| EIA: | Environmental Impact Assessment |
| GMO: | Genetically modified organism |
| IA: | Impact Assessment |
| IAIA: | International Association for Impact Assessment |
| IEMP: | Integrated Environmental Management Plan |
| IR: | Interview respondent |
| IRP: | Integrated Resource Plan |
| ISO: | International Standards Organisation |
| MHI: | Major Hazard Installation |
| MPRDA: | Minerals and Petroleum Resources Development Act |
| NEMA: | National Environmental Management Act |
| NERSA: | National Energy Regulator of South Africa |
| NGO: | Non-Government Organisation |
| NPO: | Non-Profit Organisation |

| | |
|---|---|
| PASA: | Petroleum Agency of South Africa |
| REDZ: | Renewable Energy Development Zones |
| REIPPP: | Renewable Energy Independent Power Producer Programme |
| SANAS: | South Africa National Accreditation System |
| SAFCEI: | South African Faith Communities Environmental Institute |
| SD: | Sustainable development |
| SEA: | Strategic Environmental Assessment |
| SKA: | Square Kilometre Array |
| SR: | Survey respondent |
| TKAG: | Treasure the Karoo Action Group |
| TCP: | Technical co-operation permit |
| US: | United States |

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# Chapter 1

# Introduction

At the 2017 conference of the South African affiliate of IAIA (International Association for Impact Assessment), a paper was presented by an author of an environmental impact assessment (EIA) report for a proposed nuclear power station along the southern Cape coast. The presentation included an array of statistics, demonstrating that more people have lost their lives building alternative energy plants than have died in nuclear accidents. Nuclear power, the speaker concluded, is a 'safer' option compared to alternative energy sources. Although this assertion appeared to provoke a degree of discomfort in the conference hall, the discourse required during the plenary to counter the speaker's findings was not readily accessible to the predominantly scientific audience. John F. Kennedy captured the spirit of a counter argument in a speech before the United Nations as far back as 1961, in which he said that "(e)very man, woman and child lives under a nuclear sword of Damocles, hanging by the slenderest of threads, capable of being cut at any moment by accident or miscalculation or by madness" (Kennedy, 1998). Irrespective of whether Kennedy was referring to nuclear energy or nuclear weapons, the underlying message is the same - scientific methods of calculation are limited in their ability to reflect the human dimensions of risk.

The aim of this research is to explore the meaning of risk in the context of Impact Assessment (IA). Over the course of nine chapters, I argue that the realist definition of risk, as product of probability and consequence, is one of several ways in which risk can be interpreted. I propose that the IA discipline would benefit from a deeper and more nuanced understanding of the concept of risk as a social, psychological and cultural phenomenon. The questions that guide this research are as follows:

How has risk come to be interpreted in IA from a realist perspective?
What are the alternate meanings of risk that contend with the realist interpretation?

How can a deeper appreciation of competing constructions of risk contribute to IA's capacity to integrate stakeholder values and recognise power dynamics?

In this opening Chapter, the rationale for the research is presented. I begin with a brief motivation - how I became interested in the topic of risk and why I believe that this work is important. I then situate my contribution relative to key debates in the IA literature. This is followed by an overview of concepts and method, before I conclude with a description of the structure of the thesis.

## Why risk matters

This research is inspired primarily by my experience and knowledge of IA practice in South Africa. However, my interest in the Janus-like qualities of risk dates to the early 2000s when I was exposed to the practice of risk communication in the United Kingdom (UK). At that time I was involved in seemingly disparate but equally controversial projects: disposal options for nuclear waste at Sellafield in Cumbria, and the roll-out of 3G cellular technology. What these projects had in common was perceived potential for harm, in either case borne out of sophisticated and technical manipulation of nature: atoms on one hand and airwaves on the other. Evident in consultative forums was how contestation was either prompted or exacerbated by a disconnect between how risk analysts reified risk as an object of measurement, compared to public stakeholders, for whom risk was a far more nebulous and complex notion.

Subsequently, many years of practicing IA in South Africa has reinforced my impression that realist interpretations of risk are limited when it comes to incorporating values, beliefs, and views of diverse stakeholders, particularly in ambiguous circumstances. This dilemma is also reflected in debates around significance attribution in IA, given that significance is intended to combine both measurable (scientific or literal) and non-measurable (human) value systems (see *inter alia* Ehrlich & Ross, 2015; Rossouw, 2003; Sadler, 1996; Sadler & McCabe, 2002). Furthermore probabilistic reasoning and scientific calculations are also not inclined to anticipate 'behavioural' causes of harm which may be related to fallibility - corruption,

conspiracy, incompetence, and so forth. Related difficulties for IA stems from the dependence of the discipline on public trust in expert predictions and confidence in institutional decision-making competencies. Retief and colleagues (2016) and Weston (2004) are among several commentators who have suggested that circumstances were more conducive to trust when IA was first conceived in the late 1960s, but can no longer be taken for granted and in the kaleidoscope world of today. As the COVID-19 pandemic (in the midst of which I am writing this thesis) has epitomised, we are living in extraordinary times in which change is "the central dynamo of existence" (Young, 2007:59).

The effects of change is an important consideration in the South African setting for this research. What needs to be considered by those with a formal role in IA is that anxiety is no longer a 'diagnosis' requiring intervention. As argued by Wilkinson (2001:66) being in a state of anxiety is "a right and proper response to anticipated dangers in the social reality in which people find themselves". This is particularly the case when individuals or communities either lack, or are denied, physical, economic and/or cognitive resources for protecting themselves against potential harm.

At the core of my rationale for this research is the proposition that IA is fundamentally all about risk: "the risk of environmental changes occurring as a result of a proposed activity going ahead, together with the risk of those changes affecting local people in some way" (Morgan, 1998:41). As the most widely used method for anticipating the significance of environmental and social impacts of development decisions, IA plays a pivotal role by bringing together strands of scientific and social knowledge, and deciding where the emphasis should fall in making recommendations to decision makers. Under current circumstances, in which people feel as if they are living in a state of perpetual crises, IA cannot be a static tool – the discipline must evolve to keep pace with changes in attitudes, circumstances, and responses to uncertainty. Therefore, and alluded to in my opening anecdote, the IA discipline cannot continue to 'play it safe'. It is time to push the envelope in our understanding of what contributes to the meaning of risk for the IA discipline, and how this affects determination of impact significance in a contemporary context.

## The research context

My investigation of alternative interpretations of risk is rooted in the intersection of several concerns for the discipline of IA. By 'discipline' I am referring to the formal and professional process of "identifying, predicting, evaluating, and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made" (IAIA, 2009). In the context of this research, I use the term IA to include EIA, Strategic Environmental Assessment (SEA), and the specialist studies within these. These are recognised as the most widely deployed pre-emptive and facilitative instruments for ensuring that environmental consequences are considered in development decisions (Abaza et al., 2004).

Key among challenges for IA is the integration of an expert-led process with stakeholder values. This challenge is exemplified by Sadler's commentary on assessing impact significance:

> *Evaluation of significance is subjective, contingent upon values, and dependent upon the environmental and community context. Scientific disciplinary and professional perspectives frame evaluations of significance. Scientists therefore evaluate significance differently from one another and from local communities* (Sadler, 1996:121).

An ensuing supposition is that power relations can affect IA processes and outcomes. As suggested above, tensions tend to be amplified when there is uncertainty, skepticism, and lack of trust. Neither debates about values nor power are new for the discipline of IA - both concerns feature prominently in scholarship about significance determination and IA effectiveness (see for example Bond & Pope, 2012; Cashmore, 2004; Cashmore et al., 2010; Chetty, 2015; Duinker & Beanlands, 1986; Ehrlich & Ross, 2015; Elling, 2009; Fischer et al., 2020; Jay et al., 2007; Loomis & Dziedzic, 2018; Morgan, 2012; Morrison-Saunders & Retief, 2012; Ortolano & Shepherd, 1995; Rossouw, 2003; Rozema & Bond, 2015; Sadler & McCabe, 2002; Weston, 2014). I propose that these concerns can be coupled to competing constructions of risk. An objective of this research is, therefore, to introduce a new perspective on issues that have been a source of concern for IA scholars and critics for several decades. Unpacking the concept of risk for IA involves exploring its scientific roots, the way in

which its meaning has evolved, and how it is nowadays harnessed by different actors according to their needs and aspirations.

**Dealing with uncertainty**

In the context of what Giddens (2002:1) has labelled a "Runaway World" this research relies on diverse socio-cultural theory theories to uncover alternative meanings for risk. In this respect it is evident how environmental research is generally moving away from disciplinary silos, in attending to cross-cutting causes and effects and their implications. There is a call for "holistic transdisciplinary approaches" that go beyond the perspectives of distinct specialities in order to integrate "the natural, social and health sciences in a humanities context" (Choi & Pak, 2007). Such holistic and integrated approaches are key to future forecasting, particularly in respect of climate change and the uncertainties that come with this phenomenon. Shifting focus to the science-social interface is reflected in terms appearing more frequently in the literature - complex human-ecosystem dynamics, wicked environmental problems, post-normal science, building resilience, adaptive management, and so forth (for example, Adger et al., 2016; Allen & Holling, 2010; Audouin & Sitas, 2019; Bond et al., 2015; Cilliers, 2000, 2008; Folke, 2006; Greig et al., 2013; Partidario & Gomes, 2013; Ravetz, 1999; Slootweg & Jones, 2011; Stirling, 2010; Thompson, 2018; Walker et al., 2002; Welsh, 2014; O. R. Young et al., 2006; Ziervogel et al., 2017).

Granted the importance of these contributions, outside of academic circles there is a simpler public discourse, linked to uncertainty and characterised by anxiety, blame and fear of what may happen next. What I demonstrate in this research is how 'risk' is apt in respect of both scholarly interpretations of current environmental challenges, and ordinary people's responses thereto. As has been inferred by Lawrence (1997), risk is also a key principle for theory building in IA. It follows that a nuanced understanding of this principle is important for bridging innovative transdisciplinary research concerned with future forecasting, to the more practical tool of IA.

**The values debate**

The role that stakeholder values should play in the assessment of significance in IA has been an ongoing debate (for example, Audouin & de Wet, 2012; Beattie, 1995; Cape et al., 2018; Cashmore, 2004; Connelly & Richardson, 2005; Duinker & Beanlands, 1986; Ehrlich & Ross, 2015; Ortolano & Shepherd, 1995; Pope et al., 2013; Weston, 2000, 2004). Writing from a land-use planning perspective, Campbell (2002:274) highlights concern with values as fundamental to a process of "judging between better and worse" in a world where "knowledge can only ever be partial and transitory". Drawing on Campbell's insights, Connelly and Richardson (2005:392) describe values for IA as "those principles or standards held by individual or groups which are embodied in their conception of what is good". From this one presumes that goodness has tangible and intangible qualities – meaning that it can refer to actual things which are precious or treasured, as well as standards of morals or ethics. In the context of this research, I regard either or both types of value as meaningful. Coupled to this is the inevitability that expert predictions will not consistently match the expectations and priorities of stakeholders.

In his state of the art review, Morgan (2012) identifies a prevalent theme in the critique of IA as the limitations of the rational-scientific model for IA. Where this model is relevant to the topic of this thesis is in the comfortable fit it offers a realist definition of risk. As will be discussed in the next chapter, this definition is consequently not separate or immune from scholarly critique of the standard procedural model. Apropos my research is the general consensus among scholars, that deep-rooted rationalist and positivist ideals underpinning IA limits its potential to contribute to sustainability: the assumption in this work being that the concept of sustainability refers not only to environment and resource management but also to societal norms - civil rights, justice, well-being, and equity (O'Riordan, 1999).

The socio-cultural theories outlined in this thesis are especially relevant to Partidario and Sheate's (2013) concerns about the relationship between IA and sustainability. Accordingly, the sustainability objective for IA does not automatically translate to recognising what is meaningful for stakeholders, or empowering individuals and

communities who may view themselves as having little or no agency in the IA process. Aspects of theory introduced in my exploration of alternative interpretations of risk resonate with what Stoffle and Minnis (2008) describe as a 'two-communities' theory to explain difficulties in translating stakeholders concerns to decisions-makers. These authors suggest that institutional actors and public stakeholders "live in separate worlds with different and often conflicting values, different reward systems, and different languages". What several studies have also shown, is that the process of involving stakeholders does not necessarily equate to sustainable outcomes (Rozema & Bond, 2015; Runhaar et al., 2013; Wiklund, 2005).

Efforts to uproot IA from its rational underpinnings include suggestions for alternative models (Bartlett & Kurian, 1999; Cashmore, 2004; Leknes, 2001; Weston, 2000) and an emphasis on learning from other disciplines, especially what Healey (1996:217) has referred to as the "communicative turn" in planning theory (see also Lawrence, 2000; Morgan, 2012). According to Glasson and colleagues, and as alluded to above, IA has gradually advanced from its origins "in a climate of a rational approach to decision-making" that may have existed in the USA in the 1960s (Glasson et al., 2012:13). The original focus on systematic process and objectivity has shifted: "it is now realistic to place the current evolution of EIA somewhere between the rational and behavioural approaches – reflecting elements of both" (Glasson et al., 2012:20). My research is biased toward the latter. In respect of this emphasis, several 'state of the art' reviews of IA stress the need for further research into how IA can be accommodating of pluralism and also show more tangible benefits for diverse sets of stakeholders (Bond & Pope, 2012; Jay et al., 2007; Loomis & Dziedzic, 2018; R. Morgan, 2012; Weston, 2004). The alternative interpretations of risk presented in this thesis demonstrate how risk can be constructed off the basis of pluralism, involving institutional, political and public stakeholders with diverse values and aspirations.

#### The power debate

The role of power and its effects is arguably a more recent debate for the IA discipline, one that has been championed by, among others, Bond & Dusík, 2020; Cashmore & Axelsson, 2013; Cashmore & Richardson, 2013; Flyvbjerg et al., 2003; Flyvbjerg &

Richardson, 2002; Hansen et al., 2013; Richardson, 1996, 2005; Sharp & Richardson, 2001. Among important themes in this work is the propensity in IA to prioritise specialist knowledge in support of expert systems. Cashmore and colleagues (2015) have proposed in this regard that experts "construct reality by arbitrating on those aspects of the environment that are considered knowable, and those which are beyond knowledge claims" (Cashmore et al., 2015:87). Attention has been drawn to how this can mask the value-driven character of IA: as Connelly and Richardson (2015) have stressed, recognising the subjective nature of judgements and decisions on the part of the environmental assessment practitioner (EAP), must go hand in hand with acknowledging that other judgements may be discounted. My research builds on this notion of asymmetry through the idea of competing constructions of risk, implying that one interpretation may be promoted over others.

Another feature of power relates to it either being overtly or subtly manifest in IA. On one hand there is the obvious ability of IA practitioners to sway decisions about development proposals. Besides from this there are also familiar or orthodox behaviours and choices. Scholars including Weston (2014), Lawrence (2013), Beattie (1995), and Boholm (2008) have highlighted a myriad of subjective decisions that can influence the process and results of the IA. As Lawrence (2013:70) observes, these are often "simply presented as expert pronouncements or conclusions". The case studies in this thesis highlight several influential decision points including who the stakeholders are; how they are involved; how information is framed; which issues require investigation; the extent of the investigation; and how impacts should be mitigated or managed.

It is widely and correctly assumed that power is skewed in IA to developers or those acting on their behalf (Glucker et al., 2013). Whilst showing this to be the case, this thesis also offers a wider Foucauldian perspective of power, by highlighting the capabilities of anyone, or any party, to act strategically in attempts to garner or redistribute power. As Enríquez-de-Salamanca (2018:14), among others, have also stressed, it is important not to idealise public participation – "because many opinions exposed during this process are individual and even spurious, not necessarily related to environmental concerns". Claims and statements made by various participants, on

the part of governing institutions, their advisors, affected communities or well-intentioned civic organisations, shape distinctive discourses to deal with potential for harm.

Furthering the debate about power and its effects, this research shows how values and a role for power are essentially two sides of an argument for a multifaceted understanding of risk. The case studies included in Chapters 6 to 8 establish risk as a locus for discursive struggles in IA: "impassive, formal, calculating" on one side, and "full of human hopes and fears" on the other (Blastland & Spiegelhalter, 2014).

### The South African setting

In South Africa, debates about power and stakeholder values must be seen in context of the most productive IA jurisdiction in the world. Given an average of 3 600 IA reports per annum (Kidd et al., 2018), there has been considerable focus in this country on streamlining the IA process and promoting professionalism. As a result the discipline has been increasingly bound to rigid timeframes, prescripts and most recently, a mandatory certification process for practitioners.

Notwithstanding the institutionalisation of IA and advanced state of practice, in-country research indicates that a regimented system has not resulted in improved performance, nor made the process more effective (Kruger, 2012; Retief, 2011; Retief & Chabalala, 2009; Sandham et al., 2013; van Heerden, 2010). It has also become more common for the standard of some assessment practices and quality of IA reports in South Africa to be spotlighted in the media, prompted by public complaints about bias and lack of inclusivity (Bloom, 2021; Carnie, 2021a). Outside of South Africa, Kågström and Richardson (2015) argue that legislative amendments, changing policy, and developing new guidance cannot guarantee a workable framework for responding to change, and the new issues that come with change.

Sectors of government in South Africa see the solution to the country's socio-economic challenges as involving further commodification of natural resources, and the roll out of large infrastructure projects. These ambitions have placed environmental authorities under pressure to ensure that IAs are not a hindrance to the

implementation of the National Development Plan (Day, 2015). Notwithstanding imperatives to attract development and spur economic growth, South Africa has a comprehensive National Environmental Management Act (107 of 1998) (NEMA) which leaves little room for compromise on strict IA requirements. Principles included in section 2 of NEMA require that environmental assessment and management must place people and their needs at the forefront of its concern, and serve their "physical, psychological, developmental, cultural and social interests equitably" (s2 of NEMA).

In a recent precedent-setting case[1], the Judge in the High Court referred to the IA as "a key means of promoting sustainable development, by ensuring that the need for development is sufficiently balanced with full concern of environmental impacts" (page 32 of the judgement). The case focuses attention to the directive principles in NEMA, including that cited above, which "caution decision-makers to adopt a risk-averse and a careful approach, especially in the face of incomplete information" (page 32 of the judgement). The Thabametsi case, as it has become known, thus confirms that sustainable development principles must be explicitly translated into goals for IA, particularly when evidence is lacking, or scientific predictions are inconclusive.

The case studies in this thesis are bound to South Africa's IA conundrum – how to navigate competing agendas: speed and efficiency on one hand, and completeness and inclusivity on the other. In these circumstances, issues related to power and values are manifold, and reflective of how the notion of sustainability becomes skewed to fit and progress particular agendas, be they social, political or economic. This thesis offers a new perspective on the problem by applying the lens of socio-cultural theories, linked to alternative interpretations of risk.

## Research approach

My approach to building an argument for a deeper understanding of risk for IA starts from the proposition that the meaning of risk is not static. In the following chapter, I offer a historical perspective to show how, since IA was first conceived as a rational-

[1] Earthlife Africa Johannesburg v Minister of Environmental Affairs and Others (65662/16) [2017] ZAGPPHC 58; [2017] 2 All SA 519 (GP) (8 March 2017)

scientific tool, its meaning has evolved. I trace the passage of risk from the expert domain of science into a much wider societal setting. In a contemporary context, characterised by change and volatility, risk permeates public discourse. No longer the exclusive preserve of experts, I show how risk is nowadays a phenomenon, available to be appropriated and discursively transformed according to assorted needs, desires and priorities. This perspective on risk underpins my conceptual and theoretical framework, as well as the methods used in the research to explore competing constructions of risk in the three South African case studies.

**Conceptual and theoretical framework**

My conceptual approach relies on a combination of corpus linguistic studies and critical discourse analysis to frame the meaning of risk. Accordingly, I don't view the phenomenon of risk as a boundless concept to be interpreted arbitrarily. Nor do I suggest that it substitute the realist techno-scientific interpretation. Instead, I propose a conceptual framework in which interpretations are underpinned by three sources of meaning: the anticipation of harm, the existence of an object of value, and the need for a strategy. This framing supports risk interpretations which vacillate along a continuum - from realist at one end, to constructionist at the other (Lupton, 2013b). Whilst potential for harm is requisite, there is also opportunity to consider value orientated and strategic dimensions of risk.

Departing from the realist end of the risk continuum, I describe three distinct theories toward a deeper understanding of risk: theory of the risk society, the psychometric paradigm and cultural theory. These theories provide a three-pronged theoretical framework for an analysis of the construction of risk in three South African examples of IA: a specialist risk assessment for a bulk fuel storage facility, an environmental impact assessment (EIA) for the siting of a nuclear power station and a strategic environmental assessment (SEA) for proposed hydrofracking for shale gas in the Karoo. These three cases are thematically linked to concerns about the reliability of electricity supply in South Africa and are, therefore, couched in a highly politicised 'energy debate' in the country. Underlying this debate is a prevailing sense of unease and lack of confidence in the government's ability to resolve chronic electricity

shortages that have been affecting the economy, and the well-being of South Africans for over a decade. This backdrop is conducive to exploring the effects of diverse interpretations of risk that social and institutional actors bring to bear on the respective IA processes.

**Method and case studies**

This research adopts the constructionist perspective of risk, by proposing that knowledge about risks can be viewed as a "product of discourse" (Boholm, 2016:17). As has been underscored by scholars working in the tradition of discourse analysis, all discourse-based research is guided by the presumption that language plays a major role in our pre-disposition to perceive the world "in a specific fashion" (Alexander, 2010:6; also Alexander, 2018; Boholm, 2016; Janks, 2007; Jørgensen & Phillips, 2002; Wertz et al., 2011). Foucault's theory, which further informs my approach, assumes that all discourse is suffused by power, and that different discourses compete for influence in society (Graham, 2005; Khan & MacEachen, 2021; Richardson, 1996; Sharp & Richardson, 2001). As such, there cannot be a truthful or exact definition of risk, instead meaning is 'manufactured' in the roles people adopt and the associated contexts in which risk is attributed to one or other possibility.

My approach to uncovering meaning in this thesis focuses on the production of IA and the multiple strands of discourse that 'give shape' to risk, before or without the sensory experience of harm. I consider specific instances of practice, words and symbols in risk 'manufacturing' for IA. Given that Foucault was not prescriptive with regard to method, various approaches have been used in mobilising a Foucauldian philosophy of discourse for research purposes (for example, Graham, 2005; Hajer, 1995; Khan & MacEachen, 2021; Richardson, 1996). In this thesis I am guided by Fairclough's Critical Discourse Analysis (Fairclough, 2001)for exploring the meaning of risk for IA. Fairclough's methodological model for CDA comprises three dimensions of discourse – a textual (descriptive) dimension, a process (interpretive) dimension and a contextual (explanatory) dimension. Consistent with Foucault's (1998:101) contention that discourse both "transmits and produces power", CDA's dimensions attend to actual discursive practice (speech and text) within a wider contextual realm -

the “places, moments, and institutions” where “argumentative struggle” occurs and some perceptions “seek to dominate over others” (Hajer, 1995:19).

Harnessing the method of discourse analysis to components of IA has presented several challenges. From a theoretical perspective, influential discourse philosophies and methodologies are not fixed in time. Ideas about discourse and its relationship to social practice are continually evolving, making the harnessing of methods to a particular theory or way of thinking about discourse, a complex endeavor. I elaborate on this challenge in my Methodology (Chapter 5). A second, more practical challenge, relates to my selecting manageable ‘instances’ of discourse for case study analysis, and deciding which aspects of debates in the wider process and explanatory dimensions of CDA to focus on. The selection process has led me to concentrate on specific components in each of the IAs under consideration. In the case of the bulk fuel storage facility, I focus on the specialist Risk Assessment study. In the nuclear power station case, I draw primarily from the Comments and Response report on the stakeholder engagement process. Finally in the SEA for hydrofracking, the primary source for my analysis is the Summary for Policy Makers. I emphasise in my examples aspects which may ordinarily be taken at face value, or accepted as convention in the customary rational scientific framework for IA. In this respect I consider “how it is that forms of words can have forces which seem highly unlikely if one considers them out of context” (Fairclough, 1992:82).

A characteristic that my case studies for this research share with other discourse analyses, is that they represent a particular issue at a specific point in time (Sharp and Richardson, 2001). Each of the situations I consider provide context-dependent knowledge. In this regard, I have embraced Flyvbjerg’s (2006) critique of more conventional case study research, which argues that case studies do not need to prove a theory to be a useful learning tool - all the more so because theories in the social sciences are seldom robust. The theories presented in this thesis are no exception and I consider how each theory has been critiqued in Chapter 4.

Flyvbjerg (2006) challenges conventional wisdom about needing to have multiple case studies, stressing that it is possible to generalise from one or a few carefully and

chosen “paradigmatic” cases, intentionally selected because they are rich in information, and because they activate a range of actors and characteristics of what is being studied (Flyvbjerg, 2006:228). Accordingly, I have chosen the case studies presented in Chapters 6 - 8 on the basis of my expectations about the information content - relying on their being more likely to demonstrate my proposition about the usefulness of social theories of risk for the IA discipline. To this end, the results of the analyses of the cases are augmented by insights gained from a small survey of practitioners; and two in-depth interviews that I conducted with two past Presidents of IAIA (South African affiliate) who have also been actively involved in developing guidelines for best practice.

## The structure of the thesis

As suggested in the description of my approach, discourse analysis is more than just a method. The idea of discourse is influential to every stage of the research – from the formulation of research questions to the analysis of empirical material. From a discourse perspective, the relationships between risk and IA is a relationship between a discursive practice and a social practice. In subjecting this relationship to analysis, the focus must be on connecting discursive practices to broader social and cultural developments and structures (Jørgensen & Phillips, 2002). This intention guides both my approach, and the structure of the research study.

Following this introduction, **Chapter 2** begins with a historical account of risk. Here I aim to address the first of my research questions to do with how risk has come to be interpreted in IA from a realist perspective. I draw on etymological references to explain how the technical interpretation of risk originates in the idea of a predictable future based on the reliable and replicable patterns that underpin statistics and probability theory. I proceed to highlight the difficulties upholding this predominantly realist meaning of risk in an epoch that is characterised by rapid change and declining trust in institutions and expert calculations. In the final part of the review, a survey of the IA literature confirms the prevalence of a customary realist interpretation of risk for the discipline.

Having demonstrated the reliance of the IA discipline on a realist interpretation of risk, the focus of **Chapter 3** is on the alternative view of risk as a discursive phenomenon. In this part of the thesis, I invite consideration of alternate meanings of risk that compete with the realist interpretation, in response to my second research question. Accordingly, I draw on linguistic studies to demonstrate how risk is deployed in everyday speech. These studies reflect associations that may be discounted, or marginalised, in the realist definition. This leads me to propose three diagnostic features that underpin the meaning of risk: potential for harm, an object of value and the need for a strategy. From the basis of this diagnostic, I recommend a view of risk as a "product of discourse" (Boholm, 2016:17). I conclude the chapter by introducing Fairclough's CDA as a method for analysing risk in the context of my case studies.

**Chapter 4** expands on the ideas introduced in Chapter 3 relevant to my second research question. Here I outline the theoretical framework for the empirical component of my argument. The theories that comprise this framework are important, not only for developing alternate meanings for risk, but also to ground the research in specific counter interpretations, thus reigning in the ambiguity that can detract from the usefulness of CDA. I begin the chapter with an overview of the 'risk continuum' (Lupton, 2013b) and the multiple theories that can feature between the highly realist and highly constructionist ends of this spectrum. I home in on three theories and explain why these provide the most appropriate lenses for my case studies of IA. They include the risk society theory, the psychometric paradigm and cultural theory.

In **Chapter 5,** I present a detailed account of my research design, emphasising the links between concept, theories and method. Leading up to an explanation of my methods, I described how a Foucauldian type of discourse analysis has been used by other researchers to study environmental debates and disputes, and the learning these applications offer for my research. I distinguish my research as relying on Fairclough's CDA with its three intersecting dimensions: textual, descriptive and explanatory. I proceed to outline the specific methods used to explore the construction of risk in the

case studies. I end this chapter by reflecting on the limitations of the method, and the ethical dilemmas that I wrestled in respect of my allegiance to the practice of IA.

The empirical **Chapters, 6, 7** and **8,** allow for a deeper appreciation of competing constructions of risk relevant to my third research question. Each of these chapters includes a discourse analysis of risk in examples of IA practice, against the backdrop of South Africa's energy crises. The cases are examined via the conceptual lenses of the risk society theory in respect of a specialist study of the fuel storage depot; psychological theory for the EIA of the proposed nuclear power station; and cultural theory for hydrofracking in the Karoo Basin. I provide a brief overview of the respective IA tool in the South African context, as the 'order of discourse' in each case. Guided by the process, textual and explanatory dimensions of CDA, I explore how risk is constructed from the perspective of a diversity of stakeholders in each case. As indicated above, the insights offered by the case studies are complemented and enriched by the results of a small survey and two in-depth interviews with experienced EAPs about how they interpret risk in IA.

In the final **Chapter 9** of the thesis, I conclude my exploratory journey into the meaning of risk for IA, focusing on the contribution this research makes to IA's capacity to integrate stakeholder values and recognise power dynamics. Whilst emphasising that alternative interpretations are not intended to discount a need for risk calculations, I recommend an informal enquiry into harm, values and strategy. This ought to facilitate deeper and more precise insight into that which holds meaning for stakeholders, and the origins and forms of power. This reframing of important issues from a risk perspective contributes to strengthening the foundations and practice of IA, in anticipation of an increasingly uncertain and unpredictable future.

# Chapter 2

# Origins of risk and its interpretation in IA

The purpose of this chapter is to offer a brief review the evolution of risk. Its purpose is to provide an explanation as to how risk has come to be interpreted from a predominantly realist perspective as purported in my first research question. I begin the chapter with a brief historical account of risk, and how this term became associated with numerical literacy and predictive models. I suggest that this association has facilitated an understanding of risk as a subject for analyses, particularly in the engineering and science-based disciplines that intersect with IA.

In the second part of the chapter, I reflect on the progress that has been made in the discipline of risk analysis to accommodate the effects of uncertainty as well as the human dimensions of risk, but also underscore the contemporary challenges that affect both the accuracy and believability of forecasts. In the last part of the chapter, I focus on the interface between risk analysis and IA. Here I draw on the discipline specific literature to identify trends in how the role of risk is interpreted in the discipline of IA. I conclude that, whilst scientists have advanced techniques to quantify and analyse risk in ways that are helpful for IA, the sociocultural construction of risk is an area of research that has received limited attention from IA scholars and researchers.

## The roots of risk in a numbers game

There are a surprising number of publications dedicated to exploring the origins of risk. Some of the more comprehensive historical accounts include *Taming of Chance* and *The Emergence of Probability* (Hacking, 1990, 2006); *Games, Gods and Gambling* (David, 1998); *The History of Statistics: the measurement of uncertainty before 1900* (Stigler, 1986); *Statistics in Britain 1865-1930: the social construction of scientific knowledge* (MacKenzie, 1982); *Risk analysis and risk management: An historical perspective* (Covello & Mumpower, 1985) and *Against the Gods: the remarkable story of*

*risk* (Bernstein, 1998). The titles of these contributions are telling of how risk has evolved, and various accounts in these texts confirm that the specific derivation of the term has not been definitively established. What scholars do agree on, is that risk originates in a desire to uncover regular patterns over time which can be used to determine future outcomes in quantitative terms.

The oldest account is described by Hacking (2006), tracing the idea of risk to Indian literature going back ten centuries. A particular Indian legend (called Mahábarata) is thought to date to the 9$^{th}$ century, translated from Sanskrit to English in 1860. It tells the story of Nala and Kali, and their rivalry to win the hand of a beautiful princess. After losing this contest, Nala is cursed by Kali and wanders the land in a demented state before accepting a job as charioteer to a foreign journeyman. The latter flaunts his skills in mathematics by estimating all the leaves and fruit on two branches of a tree by examining a single twig. He teaches this skill to Nala who uses it in a gambling contest to win back the hand of his princess. The translated phrase that interests Hacking (2006:7) in this legend is spoken by the journeyman: *"I of dice possess the science and in numbers thus am skilled".* The author infers from this statement that even in ancient times there existed the idea of "a genuine science" that could be mastered in relation to chance.

The link between risk and gambling has also been speculated on by other risk historians. David (1998), for example, cites evidence for such a connection in the form of polished, and often-engraved, talus (knuckle) bones found on archaeological sites in Egypt and other ancient civilisations. The symmetry of these bones, coupled with tomb illustrations, suggest that these were used for gaming. Such theories, highlighting a connection between risk and gambling, point to risk having both positive and negative connotations - associated with potential wins or losses.

Other explanations for the origins of risk refer to mercantile trade in the middle-ages, Bernstein (1998) suggest that the Greeks used "Rhizikon" as a seafaring term. It is presumed that this denoted the threats likely to be encountered on unchartered waters – rough seas, reefs, and so forth; but also linked to the prospect of losing valuable cargo. Similarly Ewald (1986:xxii) refers to the Italian translation of "risco"

meaning “reef”, referring to the “ever-present danger of shipwreck that confronted traders in their travels to the New World”. Both Ewald (1986) and Luhmann (1993) describe the roots of risk in maritime trade as signifying an early type of risk management arrangement whereby merchants recognised the likelihood of potential losses, and the need to transfigure this potential into some form of measurement. Accordingly probabilistic logic could be applied “to the practical question of how to compensate for economic loss while making a profit” (Ewald, 1986:xxii).

Relevant to the realist interpretation of risk in IA is that theories about its origin, although distinct, share a tendency to associate the calculation of risk with the idea of intellectual sophistication and progress. Bernstein (1998:1) explains this connection as follows:

> *The revolutionary idea that defines the boundary between modem times and the past is the mastery of risk: the notion that the future is more than a whim of the gods and that men and women are not passive before nature. Until human beings discovered a way across that boundary, the future was a mirror of the past or the murky domain of oracles and soothsayers; who held a monopoly over knowledge of anticipated events.*

Thus, the “mastery of risk” was seen as an alternative to the doctrine of divine providence - a shift from the era of “signs from the gods” (Covello & Mumpower, 1985) to one of “colonisation of the future through human intellect” (Reith, 2004:384). This intent aligns with the Weberian (Weber et al., 1948:155) idea that, with the advance of industrialisation, the world became “disenchanted” - or as Nowotny (2003:17) writes, “a triumphant science acquired a monopoly of describing and explaining ‘reality’”.

The shift in dominion over the future, from religion to science, via the predictive mechanism of risk, has been chronicled by several scholars (for example, Adams, 2001; Covello & Mumpower, 1985; Reith, 2004; Zinn, 2009). Counter to what one might presume, however, it was theologians and not scientists who are thought to have penned the first textual reference to risk in the English language (Bernstein, 1998). The reference appears in an influential treatise called Port Royal *Logic*, first published in 1662. Its authors (Antoine Arnauld and Pierre Nicole) were associated with the Port-Royal Abbey, a centre for the heretical Catholic Jansenist movement in

seventeenth-century France. This movement emerged out of a conflict with Catholic orthodoxy over philosophical issues concerning the role of free will in salvation, and the meaning of penitence (Buroker, 2017). The authors propose that "fear of harm ought to be proportional not merely to the gravity of the harm, but also to the probability of the event". What is noteworthy about this characterisation of risk is that the feeling of "fear" is integral to probabilities, whereas later definitions in which risk is a product of probability, suggest that such probabilities should inform the need for fear.

Established more or less at the same time that the Port Royal *Logic* was transcribed, a leading agency in the endeavor to pin down an unequivocal definition of risk has been the Royal Society[2] (Newby, 1997). In his book simply entitled *Risk*, Adams (2001) devotes a chapter to how the Royal Society has influenced the meaning of risk. The motto of the Society, *nullius in verba*, is loosely translated as "take nobody's word for it". According to the Society, the motto expresses the determination of its Fellows to verify all statements by an appeal to facts.

In 1983, a Study Group of the Royal Society (Royal Society, 1983) cited in, among others, Adams (2001:8), Denney (2005:17) and Heyman and colleagues (2013:1) proposed that risk be understood as:

> *the probability that a particular adverse event occurs during a stated period of time, or results from a particular challenge. As a probability in the sense of statistical theory, risk obeys all the formal laws of combining probabilities.*

This understanding is reflected in risk definitions "most commonly encountered in the risk and safety literature" (Adams, 2001:8). It has been linked to the Royal Society's emphasis on the duty of governments "to apply themselves explicitly to making the environment safe, to remove all risk or as much of it as is reasonably possible" (Royal Society, 1983, cited in Adams, 2001:11).

[2] The Royal Society is the world's oldest national scientific, founded by a group of twelve eminent scientists in London in 1660. It has since expanded to include approximately 1600 of the world's leading scientists with its primary function being to promote scientific knowledge on a range of topics including risk.

Notably, the Royal Society's definition of risk changes in a subsequent report, published a decade after the first (Royal Society, 1992). In an interview with Bob Heyman, Nick Pidgeon, who was one of the authors of the 1992 report, alludes to a dispute about the definition, in saying that the Society "could have done without the social science chapters really, because they weren't very happy with some of the things we wrote" (Heyman & Brown, 2012:121). Pidgeon describes how the Society objected to the way he had developed the objective/subjective risk debate, which was that "risk assessment involves judgement all the way along the line, and there is no such thing as a real risk" (Heyman & Brown, 2012:122). He speaks about the Society's refusal to accept a non-realist interpretation of risk:

> *The Society argued that this claim either had to be changed, or they could not endorse it, because risk to them was a real thing. And so they were thinking from the conventional engineering science perspective, and there was also objection by referees to a fairly innocuous table I had inserted based upon the work of Charles Vlek which made the simple point that there are multiple definitions of risk in the literature and in risk practice . . . And, of course, the Society wanted a single definition* (Heyman & Brown, 2012:123*).*

The consequence of this debate was that the meaning of risk in the 1992 Royal Society report remains unchanged, but there is a distinct shift in tone, from one of general respect for and acceptance of the "formal laws of combining probabilities", to a need to defend this commitment from the influence of alternative meanings:

> *The view that there is a distinction to be made between, real, actual, objective, measurable risk that obeys the formal laws of statistical theory, and subjective risk inaccurately perceived by nonexperts is still the mainstream position in most of the research and literature on safety and risk management* (Royal Society, 1992 cited in Lidskog, 2008:35)

Whilst the Royal Society's definition of risk affected primarily the UK and European interpretations, across the Pacific in the United States (US) similar concerns about the science of risk versus perceptions affected the development of influential policies and guidance. Both the US Environmental Protection Agency (EPA) and the National Research Council (NRC) were focused on developing a standard approach to quantifying risk. In 1976, William Lowrence published a short but seminal survey and

analysis targeted at the scientific community dealing with technological matters affecting public safety. The publication, titled *Of Acceptable Risk* (Lowrance & Klerer, 1976), defines safety as a measure of the acceptability of risk and pronounces the need for a clear distinction between the *scientific* task of measurement and the *social* determination of acceptability.

This sentiment was reflected in an article published in *Science* magazine, in 1983, by the then EPA Administrator, William Ruckelshaus:

> *We are now in a troubled and emotional period for pollution control; many communities are gripped by something approaching panic and the public discussion is dominated by personalities rather than substance…We must all reject the emotionalism that surrounds the current discourse and rescue ourselves from the paralysis of honest public policy that it breeds…disciplined minds can grapple with ignorance and sometimes win* (Ruckelshaus, 1983).

Affirming concerns about misleading beliefs about risk among non-experts, Toft and Reynolds (2005:1), in their treatise entitled *Learning from Disasters*, decry the potentially "dysfunctional socio-psychological mechanisms that appear able to affect the perception of risk and the decision-making ability of both individuals and groups of people". The authors argue that such influences, if not explicitly managed, can prevent administrators and institutions from making the most appropriate decisions. The sum of their contention is that experts are more likely to be right in their predictions compared to those who do not "possess the science" (apropos the Indian legend described by Hacking, 2006:7).

Consequently evolution of risk, in the US and Anglo-Saxon language, has led to an association between risk and a certain type of decision - the type that rests on the outcome of the calculation of the probabilities of the unwelcome event or occurrence (Hansson, 2018). The pervasive sentiment among policy and law makers, is that the absence of probabilities leads decisions rooted in uncertainty and ignorance. Based on this way of thinking Hansson (2018) draws a distinction between an objective and subjective realm, according to which the relationship between the two concepts 'risk' and 'uncertainty' seems to be "in part analogous to that between 'truth' and

'belief'"(Hansson, 2018:2). The assumption here is that truth depends on knowledge that gains legitimacy via calculation of probabilities. Consequently uncertainty is reduced and risk becomes manageable. It is this conviction that has prompted what is referred to below as the 'professionalisation' of risk.

## Professionalisation of risk

Reflected in the preceding historical account is the emergence, in the last decades of the twentieth century, of an expert neoliberal interpretation of risk manifest in a commitment to the calculation of probabilities and deterministic consequence analysis. This trend is epitomised by the production, in the US, of what became known as the "Red Book", formally titled *Risk Assessment in the Federal Government: Managing the Process* (National Research Council, 1983). The publication of the Red Book originally formed part of a concerted drive by US regulators to impose stricter controls over the negative impacts of industrialisation on public health and safety (Löfstedt, 2003). The express aim of the Red Book is to advance "best available scientific knowledge and to preserve the integrity of scientific data and judgements in the unavoidable collision of the contending interests that accompany most regulatory decisions" (National Research Council, 1983:1).

The Red Book sets out four distinct components of risk assessment: Hazard identification, dose-response assessment, exposure assessment and risk characterisation (National Research Council, 1983). Underpinning these components is a fundamental separation between the scientific activity of risk analysis and the political activity of risk management. Löfstedt (2003) contextualises the imperative in the US to distinguish the scientific discipline of risk analysis, as a strategy on the part the EPA in that country to build public credibility and legitimacy.

In the UK and Europe, higher levels of trust in institutional decision-makers meant there was initially less concern about the distinction between risk analysis and risk management. According to Löfstedt (2003), here regulatory and advisory bodies only started to "Amercanise" risk legislation after 2000, following the Bovine Spongiform Encephalopathy (BSE) debacle, among other public health scandals (Löfstedt,

2003:1330). These events highlighted the need for a categorical model for risk assessment and the Red Book provided a useful basis for such an approach. A notable contribution of the Red Book was the notion of “default” - essentially a standard assumption or inference which is calculated to cater to absence of actual evidence. The Red Book recommends uniform inference guidelines to ensure consistency in probability calculations. These 'defaults' (standard models and approaches) include built-in assumptions regarding the constituents and toxicity of chemicals and combinations thereof (Abt et al., 2010).

Reflecting on the understandably complex and often contested process of establishing the default approach, an author of the Red Book, Omenn (2003), laments several seemingly unavoidable constraints and limitations borne out of compromise on the part of scientists involved in the process of the developing the models: “I was disappointed that we relegated variation in susceptibility to a minor status” and “we should remember how misleading are risk estimates to 3 or 4 significant figures and try to round them off appropriately” (Omenn, 2003:1159).

Despites these debates and resultant compromises, the Red Book's rendition of risk analysis prompted a general level of consensus across the western world that the analytical component of the risk assessment process, should be strictly scientific and distinguishable from other risk management interventions. Accordingly, specialised predictive assessments became an integral part of post-industrial modernisation involving the “institutionalisation of anticipation and prevention of harm” (Bartlett & Kurian, 1999:420; see also Hajer, 1995 and Strydom, 2002).

As will be shown in the case study component of this research, the distinction between risk analysis and management is also reflected in the South Africa IA context, where private consultants undertake the risk analysis whilst government departments are responsible for the management of public health risks. Important in respect of South Africa's multiculturalism, is the strong influence of US and Anglo-Saxon framings in the techno-scientific language of risk that informs both the science of risk, and the South African government's laws and policies which I refer to frequently in later chapters. In this regard, I am mindful that similar associations with risk may or

may not occur in other local languages and definitions. For example, the isiXhosa and Zulu translation for risk in South Africa, is *ingozi.* This can mean accident, danger or caution. The habit of isiXhosa and Zulu language speakers of saying sorry even if the person apologising has not been implicated in causing harm is indicative of a more fatalist view - that we are collectively vulnerable to unpredictable events. It is these nuances in the language of risk that makes it difficult to pin risk down to a unequivocal definition or explanation.

## The problem with risk

Scholarship tracing the epistemology of risk reflects how the science of risk analysis has become distinguished from the type of effective or normative risk assessment people undertake daily in the practice of survival. All living beings constantly manage dangers drawing on 'tools' and strategies including tactile responsiveness, intuition, experience, as well as fear. Referring to this repertoire of information processing abilities, Czetkovich (2009) indicates that such common, everyday understandings are sufficient in most circumstances. However, driving the production of the Red Book and other risk related policy documents referred to in the previous discussion, is expert conviction that there are particular hazards where instinctual responses need to be supplemented by "empirically supported systematic conceptualisations" (Czetkovich, 2009:xi).

Despite their conviction, what policy makers in the US and elsewhere have come to realise is that standardised approaches to calculating probabilities do not necessarily mean that related decisions are equally acceptable to all stakeholders. This realisation is reflected in subsequent publications by the US National Research Council including the 1989 guidelines on *Improving Risk Communication* (National Research Council, 1989) and the 2009 title, *Science and Decisions* (National Research Council, 2009). These supplementary guidelines underscore what has been termed the "knowledge deficit" model of risk communication (Frewer, 2004; Simis et al., 2016). As Frewer (2004) explains, this model presumes that there is a knowledge gap between the originators of scientific information and those receiving the information. Risk

professionals, therefore, have a responsibility to fill the knowledge gap, so that ordinary people can think more like experts.

Writing from both within and outside of scientific institutions, several 'sociology of science' scholars (including Jasanoff, 1993, 2007, 2012; Renn, 2008; Sarewitz, 2000, 2004, 2007; and Wynne 1982, 1996, 2002, 2006) have critiqued the deficit model, highlighting the difficulties in maintaining a plausible "expert monopoly on revealing truths" (Jasanoff, 2012:15). The following observation by Litmanen encapsulates the reasons for their reservations:

> *The problem with risk is that it is an abstract concept that refers to the future. It is not entirely here at the present moment; instead, it depends on a multiplicity of choices, which are made at the present moment. It is never entirely concrete and it always leaves room for different interpretations and debate* (Litmanen, 2001:45).

This comment alludes to two issues that are at the forefront of the problem with risk. The first relates to escalating uncertainty. The notion of a post-normal science, as proposed by Funtowicz and Ravetz (1990, 1994, 2001) and Ravetz (1999, 2006), is that we now live in a world "where facts aren't certain, stakes for decisions are high, and those decisions are urgent" (Ravetz, 1999:649). According to this conceptualisation of science, factual knowledge and the achievement of truth are referred to by Ravetz as a "luxury" or an "irrelevance" (Ravetz, 1999:649). The second issue relates to the acceptability of risks and how such is deeply connected to perceptions of fairness and justice. The two issues are related - Jasanoff (2012:5) pinpoints the crucial challenge as "trust in an age of uncertainty". More specifically the author questions how our information-soaked environments, in which we are dependent on the expertise of others, affect the democratic ambitions of public reason? This enquiry is not one about distinguishing truth from belief but about dealing with the weight of what cannot be resolved by a risk algorithm.

There are a range factors that contribute to hampering analysts' abilities to identify regular patterns by which return of events can be reliably forecast. Hacking (1990:147), refers in this regard to "space-time compression", bought about by enhanced powers of flexibility and mobility associated with the spread of technology. More

fundamental is the prescient observation by Leibniz in correspondence with Bernoulli in 1703 on the subject of mathematical probabilities, cited by Bernstein (1998:118), particularly considering the COVID-19 pandemic and mutations of the virus:

> *The difficulty in it seems to me to be that contingent things or things that depend on infinitely many circumstances cannot be determined by finitely many results, for nature has its established patterns originating in the return of events, but only for the most part. Who is to say that the following result will not diverge from the law of all the preceding ones – because of the mutabilities of things? New diseases attack humankind. Therefore, even if you have observed the results for any number of deaths, you have not set limits on the nature of things so that in the future they could not vary.*

Several centuries later, but also referring to the notion of time and statistical forecasts, from a narrative perspective, Alexievich (2017:25-26) writes about the Chernobyl meltdown as follows:

> *The night of 26 April 1986. In the space of one night we shifted to another place in history. We took a leap into a new reality, and that reality proved beyond not only our knowledge but also our imagination. Time was out of joint. The past suddenly became impotent, it had nothing for us to draw on; in the all-encompassing – or so we'd believed – archive of humanity, we couldn't find a key to open this door.*

In respect of the origins of risk, it seems that probabilities can never eliminate chance events, but can subject the possibility of their occurrence to increasingly sophisticated methods of computation. In the next section I consider how the 'numbers game' has needed to adapt in order to remain valid and useful in a 'post-normal' world.

## Risk analysis in a bid to cope with escalating uncertainty

What is evident in the historical accounts of how risk 'began' is that professional skill in working with numbers is an important foundation for risk studies. The idea that the past (statistical expectation values) can be used to put "the future at the service of the present" (Bernstein, 1998:1) is what has motivated an analytical approach to risk, centred on probabilities. Although the etymological roots of risk have been traced back to antiquity, the formal practice, or discipline of 'risk analysis' is considered to

have a relatively short history, linked to advances in aeronautics, and the atomic energy programme in the United States (Bedford & Cooke, 2001; Otway & Pahner, 1976; Strydom, 2002). Aven (2016) explains that it is only from about the 1960s and early 1970s that risk analysis became an important topic in scientific journals, papers and conferences. Scholars thus began presenting ideas and methods on how to assess and manage risk, just as the discipline of IA was gaining traction in the US and elsewhere. Calculable risk and IA were consequently on similar trajectories towards enabling "informed decisions about potentially significant actions" which would have "positive benefits for both proponents and the population at large" (Wood, 2002:1).

From a philosophical perspective, the development of rational planning instruments, including risk analysis and IA formed part of the general discourse of ecological modernisation which became prevalent in the late 20$^{th}$ century (Strydom, 2002; Hajer, 1995). Emerging in the 1980s ecological modernisation theory emphasised technological innovation, especially in the sphere of industrial production. As Mol (2000)explains, science and technology were judged to be involved in the emergence of environmental problems on the one hand, but also valued for their actual and potential role in curing and preventing them. Hajer (1995:101) refers in this respect to "an efficiency-orientated response to the environment" that came to the fore at this time, in the format of a mutually beneficial or "positive-sum game". Accordingly, ecological modernisation follows a utilitarian logic based on the idea economic prosperity and environmental protection are not mutually exclusive, and that "pollution prevention pays" (Hajer, 1995:26).

Whilst ecological modernisation theory was initially critical towards the (bureaucratic) state placing more emphasis on the market forces, from the late 1980s there was a more balanced view of state and market dynamics adopting a co-operative stance on environmental management (Mol, 2000). The idea that chance can be 'tamed' in the name of risk, befitted this philosophy and aligned to the potential of a rational model of science as an aid to bureaucratic decision-making. The relationship between science and development decisions, therefore, encompassed the formulation and application of technological solutions to environmental issues, and the hierarchical management thereof (Beck, 1992; Boholm, 2015).

As intimated in the previous section of this chapter, in the early days of risk analyses much of the work undertaken by scientists relied on statistical or frequentist-based methods by which data are aggregated over space, populations and time (Aven, 2012b; Renn, 2008). It is inevitable that such methods have become less reliable, as increasing rates of change and unanticipated events test the idea of a future as an extension of the past. Efforts to improve forecasts have resulted in a progression from predominantly statistics-led predictions, towards more nuanced and flexible approaches to calculating probabilities (Burgman, 2005). Such approaches are mostly based on Bayesian theory which provides a formal way by which predictions can be tailored to specific situations, making them more adaptable, compared to frequency-based methods assuming repeated patterns of behaviour (Aven, 2010; Berry, 2006). As Burgman (2005:7) explains, probabilities are consequently not divorced from statistics, but combined with "reasonable degrees of belief".

The work of many innovative risk analysts has shown that advances in probabilistic reasoning have taken the science of risk analysis, a considerable way toward a better handling of situations where there is a deficit in knowledge or a lack of concrete evidence (Aven, 2012a, 2012b, 2016; Goldstein, 2005; O'Brien, 2000). Analysts have developed several different approaches to respond to, or compensate for lack of certainty including interval probabilities, fuzzy probability and representations based on theories of evidence and possibilities[3] (Aven, 2012a and Burgman, 2005). Intradisciplinary debates about the accuracy of risk predictions has been further stimulated by Taleb's (2008) analogy of a "black swan", which refers to the increasing likelihood of entirely improbable and unpredictable events. The COVID-19 pandemic, for example, has been labelled a typical "black swan" type phenomenon (Harvey, 2020). This metaphor has been developed into a theory called BST (Black Swan Theory) (see Box 1). BST is applicable to a several disciplines in which risk is implicated, beyond the financial management arena in which the analogy was

[3] Based on the theory of fuzzy logic introduced by Zadeh in 1965, fuzzy probabilities account for inexact quantities by reframing these a set-valued quantities - what Burgman (2005) calls stacks of intervals, which largely comply with reality in most everyday situations. This enables best case and worst case estimates in terms of probability.

conceived. These range from medicine (Senagore, 2010) to energy policy (Krupa & Jones, 2013).

The broad domain of transdisciplinary scholarship covers a range of proposals on how traditional approaches to assessing risk can be adapted to keep pace with rapid change and uncertainty. These are characterised by what Ben-Haim (2012:1638) describes as "innovations, discoveries, inventions, surprises, and errors". This aligns to Möller's (2009) proposition that risk has become a "thick" concept – meaning that it is substantially descriptive, but also has an evaluative component. Accordingly, thick concepts "have no distinct 'natural shape' – the descriptive and evaluative aspects are intertwined and there are no descriptive delimiting boundaries" (Möller, 2009:5). Fittingly, ideas and concepts being debated around risk prediction and management, for various applications in different disciplines, may incorporate substantive or non-substative (evaluative) ideas or a combination of both. For example, the theory of precaution (Bodansky, 1991; Carolan, 2007; Kriebel et al., 2001; Löfstedt, 2004; Löfstedt & Renn, 1997; Morodi, 2016; Renn et al., 2004); multi-criteria decision analysis (Wang et al., 2009); adaptive management and resilience (Allen & Holling, 2010; Greig et al., 2013; Holling, 1973, 1978; Slootweg & Jones, 2011; Walker et al., 2002; Welsh, 2014) as well as complex systems theory (Cilliers, 2000, 2008).

Among these ideas, the last-mentioned is arguably most aligned to alternative constructions of risk. As the name suggests, complex system theory negates the type of logic that presumes social and environmental problems can be solved via linear and reductionist approaches. Along with uncertainty, constant change is inherent in complex problems Cilliers (2008) stresses the futility, therefore, in looking to pure "scientific rationality to solve our ethical dilemmas" (Cilliers, 2008:54). This scholar suggests that "we will have to deal with them as contingent and unique things" and that "complexity should help us to humanise science, not the other way round" (Cilliers, 2008:54).

Whilst many of these innovative theories are highly relevant to IA, implementing them in dynamic real-life situations in the context of what is fundamentally a pragmatic and solution-orientated tool, is not simple. In their "setting of the research

agenda" for IA, Pope and colleagues (2013:1) highlight persistent challenges. Many of these relate to procedural, time and budget constraints, including poor quality of practice, lack of meaningful public participation as well as increasing specialisation and persistence of silos within the profession. For the South African discipline, Audouin and de Wet (2012) have added their voices to the wider call for IA to focus on stakeholder values, particularly in respect of how various participants in IA perceive development and the "types of knowledge most appropriate to the environmental assessment endeavour" (Audouin & de Wet, 2012:264). Another recommendation of these authors is for the practice to draw on the skills of the humanities to gain a better understanding of the interests, power-relations and belief systems within socio-ecological systems (Audouin & de Wet, 2012:271).

Humanities scholars, particularly those who specialise in the sociology of scientific knowledge (SSK) (including Brown, 2013, 2014; Jasanoff, 2007, 2013; Lupton, 2006, 2013; Renn, 2008; Wilkinson, 2001; Wynne, 2002, 2006; Zinn, 2009, 2016) whilst acknowledging advances in dealing with uncertainty and complexity, maintain that there is still important work to be done among scientists towards a nuanced understanding of risk in particular. In this regard Aven (2012b:33) affirms that despite a significant shift to ways of thinking which acknowledges social influences, "some of the narrower perspectives (like expected values and probability-based perspectives) are still strongly influencing the risk field".

In their narrative account of how ordinary people understand risk, Blastland and Spiegelhalter (2014) make the important point that decision-makers tend to like the numbers, and the justification these are thought to provide. However, notwithstanding a desire to reduce uncertainty and quantify risk, the results of risk analyses are not always accurate, and not always helpful in "advising people how to live" (Blastland & Spiegelhalter, 2014:285). It is this predicament that EAPs are typically confronted with in their attempts to square the outcomes and recommendations of scientific investigations, within the broader socio-political context for their work. In the final part of this chapter, I will focus specifically on IA and the interpretations of risk that are prevalent in the discipline.

## Relationship between risk and IA

In the first part of the chapter, I have sought to contextualise the realist interpretation of risk in a 'numbers game' referring to historical accounts that date back many centuries. The discipline of risk analyses is in many respects, a sophisticated culmination of this origination, by which expert analysts employ various techniques to tackle uncertainty and improve the accuracy of forecasts. In this section I explore where IA fits in relation to this endeavor.

Since IA was mooted in the US in the late 1960s it has been a fundamentally stepwise procedure. Key stages include the screening of the proposal; scoping of concerns in consultation with stakeholders to focus the assessment on the most important issues; specialist investigation of the issues; determining the magnitude and significance of the impacts; identifying mitigation; preparing a report and making it available for review; and finally submitting the results to the authority responsible for making a decision on whether a project proceeds and under what conditions.

Although not all IA systems in all jurisdictions are identical, as Wood (2002) points out in a comparative review of IA in different countries, there is a considerable degree of uniformity given the common root of IA in the US National Environmental Protection Act (NEPA). As someone who was much involved in conceptualising IA and in the drafting of NEPA, Caldwell (1988b:75) has emphasised the "converging influences" that the tool was designed around, including rational planning theory, technology assessment, risk assessment, and policy goals of the environmental movement. The author also points to a fifth factor which he describes as a "popular and a legislative desire to reinforce administrative accountability through disclosure of considerations entering into public decisions by government agencies" (Caldwell, 1988b:75).

Influences on IA have, inevitably, changed over time, as Caldwell himself acknowledges (Caldwell, 2000). Yet the standard, or what Morgan (2012:9) refers to as the "classic", IA procedure is still embedded in many jurisdictions across the globe,

including in South Africa.[4] As has been highlighted by several critics, the relative simplicity and homogeneity of the standard model belies a context-specific balancing act faced by EAPs in marrying the rational scientific basis with diverse values, economic priorities, political factors, among numerous other considerations (Buschke et al., 2021; Cashmore, 2004; Morgan, 2012; Weston, 2004). In this sense, the allocation of significance in IA has always been intended to be a fusion of measurement (a scientific process of collecting, organising and analysing data) and evaluation (subscribing subjective values in order to determine their importance in a social, political and economic context. Accordingly, IA has been described as both 'science and art' (Kennedy, 1998; Morrison-Saunders & Sadler, 2010:77). Whilst the former refers primarily to IA's instrumental function to determine the anticipated severity of impacts, the latter is concerned with less tangible, speculative and intuitive influences on the process that give meaning to the impacts. As highlighted by Ehrlich and Ross (2015) there is less formal or structured guidance for the latter, compared to the former, when it comes to assessing significance of impacts.

Arguably, EAPs are drawn to the discourse of risk or risk assessment for reasons that are integral to this balancing act. Possibly, and in my own experience, the idea of risk is useful for acknowledging to stakeholders that there is always uncertainty, but that opportunities and options exist for such uncertainty to be reduced by the application of expert knowledge, and then managed via the implementation of mitigation measures. This stance is reflected in the guidelines provided by the Department of Environmental Affairs in support of South Africa's IA legislation. As an example, the Guideline for Ecological Risk Assessment (DEAT, 2002a) stipulates the following:

- The risk identification process should be rigorous and scientifically sound.
- Risk based approaches should quantify effects, determine significance and have a degree of confidence in predictions to aid decision-making.
- Probabilistic expressions of risk are useful to highlight uncertainties about the outcome of a project.

[4] The procedures governing IA are outlined in section 24 of Chapter 5 of the National Environmental Management Act (NEMA) (107 of 1998) and sub-ordinate regulations.

- The objectives of risk assessment are determined in the context of social, economic and environmental issues and decisions are made by considering these issues, but the actual technical risk assessment should not be biased or compromised by societal values or economic drivers.

Adopting a commensurate tone, the Department's Guideline for Specialist Studies (DEAT, 2002b) for IA recommends the following:

- Use of recognised survey and data collection records
- Use of a scientific approach to provide and objective and reliable assessment of impacts
- Application of specific and consistent impact description and assessment criteria
- Use of peer review and interdisciplinary consultation in impact assessment and prediction
- Prescription of relevant, effective and affordable mitigation and monitoring requirements.

Regards this type of guidance for practitioners, Cashmore and colleagues (2015:85) observe that the "subjectivity of expert practitioners is re-constituted through the documentation of expectations concerning their skills and conduct". Reflected in the above extracts is an emphasis on technical expertise required to generate an evidence-based instrument, offering solid scientific grounds for decision-making. Notwithstanding this imperative there is also an onus on the process to promote inclusivity and fairness. On top of this, there is expressed concern that scientifically derived knowledge could be compromised by uncertainty, the presence of economic drivers and potential influence of "societal values". These ambiguous expectations are indicative of a struggle to demarcate a precise role for scientific analysis in determining significance of impacts in IA. Relevant in this regard, is O'Riordan's (1999:2) view of how environmental science is evolving:

> *Science is under fire, but it remains in the most part true to its traditions. Yet there is also a change. It is the creative relationship between retaining the basic principles of the scientific method and adapting to fresh realities of the role of science in human affairs that is shaping modern environmental science.*

In a co-authored article with Rother and Patel (Day et al., 2019), we suggest that early collaboration between risk specialists and EAPs, particularly on nuclear energy and industrial projects (citing Suter et al., 1987) has meant that the definition of risk adopted by specialist risk analysts is most familiar, and therefore most accessible to EAPs. This tendency is reflected in the wider body of literature focusing on risk assessment for IA, indicating that emphasis on the realist definition for risk is not unique to the South African discipline. This approach also conforms to what O'Riordan in the above quote refers to as the "basic principles of the scientific method". As Duncan (2013:151) points out, there is a wholesale tendency for the entire practice to rely on an assumption that uncertainty is "identifiable, quantifiable and communicable". Confirming this inclination, Wlodarczyk and Tennyson (2003:179) find that risk is "typically described in IA as the product of a consequence of an activity or event, and the probability of its occurrence". Their view is supported by findings of a review of 98 environmental impact statements (EISs), produced between the years 2000 and 2010 (de Tomas, 2014), which indicated that conventional logic and quantitative approaches to assessing risks and impacts were adopted by EAPs in most reports. De Tomas Sánchez and colleagues (2018:527) describe this as "the crisp numbers method". Connelly and Richardson (2005:396), with reference to SEA, likewise observe a "general tendency…to prefer quantitative data over qualitative assessments".

An inclination toward quantification is also reflected in journal articles relating to IA and risk. In three key peered reviewed IA journals[5] the word "risk" appears in the title/abstract of 186 contributions published between 2000 and 2021. Among the topics connected to risk, by far the majority concern methods and procedures to calculate probabilities, primarily in relation to health and safety. Less prevalent risk related themes include the precautionary principle (for example, Jalava et al., 2013; Snell & Cowell, 2006; Tickner & Geiser, 2004), risk management in disaster/emergency situations (for example, Fischer, 2014; Kruger et al., 2020; Spaling & Vroom, 2007; Tajima et al., 2014) and the role of IA in managing corporate or

[5] Impact Assessment and Project Appraisal (Taylor & Francis); Environmental Impact Assessment Review (Elsevier); Journal of Environmental Assessment Policy and Management (JSTOR).

economic risks (for example, Graetz & Franks, 2013; Hood & Nicholl, 2002). This last-mentioned theme is particularly prevalent in articles about SEAs for projects financed by the World Bank and other lending institutions.

Approximately 30 articles focus on analytical methods for assessing risk in relation to biophysical components of the environment, particularly in relation to water resources, ecosystems and the marine environment. Over the last decade, there have been an increasing number of contributions concerned with impacts on wildlife and avifauna stemming from photovoltaics and wind turbines (for example, Chang et al., 2013; Masden & Cook, 2016; Sreenath et al., 2020). At least five articles focus specifically on benefits or learning that can be gained by IA from the discipline of risk analysis, thereby distinguishing this as a separate specialty within, but akin to IA, given overlapping intentions to predict consequences (for example, Demidova & Cherp, 2005; Domínguez-Gómez, 2016; Mahmoudi et al., 2013; Zeleňáková et al., 2020).

Notwithstanding the steadfastness of the realist interpretation of risk in IA, the implications of risk events being increasingly relative and contextual rather than linear, has also not escaped the attention of IA scholars. For example, Retief and colleagues (2016) refer to the implications of contemporary global megatrends, including technological innovation and international power shifts, and what this means for making and communicating predictions in IA. Bond and Dusík (2020:94) raise the alarm about the Fourth Industrial Revolution's potential to "change the face of the planet". Sandham and colleagues (2010:149) identify "a serious need to develop knowledge support … to strengthen EIA as the main decision-making tool for highly complex activities".

It is clear that making reliable forecasts about the future is going to be increasingly difficult lest "societal definitions" are allowed to "come to the fore in technological progress and political decision-making" (Bond & Dusík, 2020:97). In this respect, there have been few contributions to the IA-specific literature to date that focus on the hybrid quality of risk. This is not to say that the implications of a narrow definition of risk within the wider scope of the discipline are going unnoticed. These are being

indirectly attended to in a number of contributions, calling more generally for alternative approaches to the rational scientific theory of IA (for example, Alberts et al., 2019; Audouin, 2009; Benson, 2003; Bond et al., 2015; Bond & Dusík, 2020; Cashmore, 2004; Emmelin, 2006; Larsen, 2017; Lawrence, 2013; Lawrence, 1997, 2000; Morrison-Saunders & Retief, 2012; Pope et al., 2013; Retief et al., 2016; Retief et al., 2020; Sheate, 2010; Torriti, 2011; Weston, 2004, 2010). A common contention among these contributions is that the rational model is outdated and does not cater adequately to changing social perspectives on the level of significance of impacts. According to Weston (2004:313) "deference to the expert and our trust in science and technology" is on a steady decline.

Apart from the IA literature, it may seem incongruous that the limitations of the realist definition of risk have received considerable attention in journals specifically targeted at expert risk assessors – including the *Journal of Risk Research* and *Risk Analysis*. Arguably, this is due to the narrower focus of these journals (in contrast to the wide range of topics covered by journals catering to the practice of IA). Balog-Way and colleagues (2020) estimate that 330 publications in *Risk Analysis* between January 2010 and December 2019 dealt with one or other aspect of risk perception and risk communication. These comprise a mix of articles and case studies, highlighting issues around trust, affect (heuristics), risk acceptability, the effects of uncertainty, role of the media, and so forth. It is evident that there is a growing interest amongst analysts in how risk calculations by experts can be reconciled with public risk perception. As maintained by Wynne (2013:2) there is undoubtedly an awareness in the risk assessment fraternity of the limitations borne of the "scientistic fundamentalism" that underpins the discipline of risk analysis.

Despite critique of the rational scientific model for IA, and a shift towards a more nuanced understanding of risk in the field of risk analysis, Horlick-Jones (1998:81) points out that for some practitioners of applied natural science, the suggestion of the contingent nature of scientific knowledge is particularly unsettling: "An implied relativism, in which there is no special epistemological status for scientific knowledge, set against other forms of knowledge, appears absurd or dangerous to many" (Horlick-Jones, 1998:81). Muro and colleagues (2012:5) have also highlighted how subjective

notions of risk remains "profoundly uncomfortable for many scientists and engineers". A survey undertaken by Peterlin and colleagues (2006) in Slovenia shows that scientists' apprehension about public perceptions of risk is reflected in how they communicate with affected parties. Their study reflects an initial willingness amongst the stakeholders to confide in and trust the experts, which is subsequently undermined by the highly technical renditions of risk by the specialists, which the stakeholders find disingenuous and confusing.

Arguably one of the most important tasks of the practitioner is to translate the science into an accessible and understandable form. In this respect, Partidario and Sheate (2013:33) critique the IA discipline's capability to "broker knowledge", highlighting how controversy may result from insufficient attention to societal values, compounded by poor communication. Needless to say, not all EAPs are comparably proficient in mathematical modelling or statistical analysis, and this has implications for the shaping and 'packaging' of knowledge that is presented to stakeholders. Zhang and colleagues (2010:25-26) point to practitioners having considerable "discretionary power to make various decisions based upon a few factors, including their judgment, ideology, and personal capability as well as timing and resources, or broadly contextual factors".

As argued by Weston (2004), compounding challenges inherent in communicating the often-complex process and result of risk assessment, is skepticism among stakeholders when it comes to believing in the science. This may be justified in some instances, as testified to in several contributions to the risk specific literature that critique the level of accuracy of predictions, offering numerous reasons why risks may be either over- or under-estimated (for example, Aven, 2016; Ben-Haim, 2012; Burgman, 2005; O'Brien, 2000; Renn, 2008; Zeleňáková & Zvijáková, 2017). According to Burgman (2005) and O'Brien (2000) ambiguous results are primarily due to inherent shortcomings in models or techniques, or a lack of reliable data. However, there are also reported cases where analysts have admitted to downplaying risks, to "alleviate fears" (see Rainham, 2002:28). Political and economic motives are often a factor in how much information to share publicly – an issue that has been underscored in case study research by, among others, Bussotti (2014), Duncan (2008)

and Flyvbjerg (1998). For example, Bussotti (2014) reports on a situation in Mozambique, where information was intentionally withheld from community members regarding the consequences of bypassing fume treatment centres at a large aluminum smelter outside Maputo. This lack of transparency was justified on the presumption that communities would not understand the expert explanations behind the decision.

Such instances of poor practice exacerbate a growing tendency amongst stakeholders to treat single sources of expertise with circumspection (Weston, 2004). Moreover, as argued by Neeley (2014) stakeholders nowadays are seldom passive information recipients. Whilst scientists are increasingly recognising the importance of formal peer review (Renn, 2008; Cashmore, 2004), there are commensurate challenges that come with the availability of vast amounts of information on publicly accessible digital platforms (Bond & Dusík, 2020). Anyone who cares enough can access a great deal of 'intelligence' about a topic or method, resulting in an over-supply of self-proclaimed "experts". As has been recently demonstrated in relation to the COVID-19 pandemic, specialist advice tends to be diluted by a torrent of opinions, and a lot people are simply left wondering who or what to believe.

Judging from the number of books and journals dedicated to analytical methods and procedures, the hard-won science of calculating probabilities will continue to evolve, in search of ways to deal with uncertainty, public scepticism and the compromised status of expert knowledge. According to Pollard and colleagues (2004) recognition of the need to work with communities on risk issues is growing gradually, but gingerly. Likewise, IA practitioners in South Africa appear largely committed to retaining and developing the scientific bases for assessments, as reflected in the keynote address delivered by a lawyer for the Centre for Environmental Rights to the South African affiliate of IAIA in 2016:

> *When I was reading the programme for this year's conference, which is packed with sessions with extremely interesting titles, it nevertheless struck me that almost all of the session topics are extremely technical in nature. Which is not, of course, surprising, given that the field of impact assessment is so heavily reliant on technical and scientific*

> *expertise. But I was saddened to see that there are really no sessions discussing what I will call the human element of environmental impact assessment: firstly, inclusive and participatory decision-making, and secondly, objectivity and independence. These foundational pillars of our environmental regulatory system are pivotal: when they are absent, we cannot hope to achieve "sustainable development"* (Davies, 2016:n.p.).

At the 2019 global IAIA conference, environmental lawyer, David Morris, also expressed reservations about sources of recommendations in the process, describing IA "as a system out of balance", susceptible to becoming "a vehicle for powerful political and economic interests" (Morris, 2019:n.p.). Such observations reflect the dilemma for the IA discipline: the need to improve the quality of science for decision-making on the one hand, and qualms about being overly beholden to expert analysis, such that political and value-driven issues are prematurely discounted, or not given the same priority as technical considerations (Audouin & de Wet, 2012; Bond et al, 2015; Cashmore et al., 2010; Jay et al., 2007; Wilkins, 2003). This dilemma is captured in the following remarks by Owens and colleagues (2004), highlighting the need for reform of the traditional approaches to environmental appraisal:

> *One effect of this trend, reinforced by experience in practice, has been to undermine the old technical rational model of appraisal in which objective assessment was assumed to lead straightforwardly to better decisions. Instead, attention has been drawn to the complexities of appraisal practices, and to the different, sometimes subtle, ways in which they might secure legitimacy, influence outcomes, and lead to the adjustment of policies* (Owens et al, 2004:1944).

A consequence of a mandatory IA is the responsibility on part of democratically elected government officials to make decisions, implying that such decisions must be in the public interest. Accordingly, "legitimately determined public policies and societal values should properly influence that decision" (Ehrlich & Ross, 2015:90). The meaning of the impact cannot, therefore, be equivalent to the fact of the impact. Meaning is the value placed on change (or the potential for change) by different interested and affected parties. Writing as far back as 1984, Haug and colleagues (1984) have framed this as a 'so what?' question which determines how important or significant an environmental issue is, and to whom.

Recognising that not everyone cares equally about the same issue, speaks to the role for power in the assessment process. As highlighted by Ehrlich and Ross (2015:92) it ultimately matters "who decides". Drawing on the work of Bond and colleagues (2009, 2011), Flyvbjerg and colleagues (2003), and Mitchell and colleagues (2006); Cashmore and Richardson (2013:2) have highlighted the following important issues when it comes to power dynamics in IA: Firstly, the relationship between knowledge production and decision-making processes - and the relationships between those generating knowledge and those using it. Second is the legitimacy of the knowledge produced in EA, and the way this knowledge is used in decision-making.

Patel (2008) believes that traditional environmental management and decision-making practices have largely ignored "huge cultural changes that have been sweeping through society, and the new ways in which people view their own lives and their collective identities" (Patel, 2008:362). Recognising a need for the discipline of IA to evolve as times change, the following research needs have been identified by eminent scholars, particularly in relation to IA scholarship and theory building:

- Explicit consideration of conflict, social and environmental justice, equity and community empowerment (Lawrence, 2000).
- Attention to social risk theory toward encouraging a realistic reflection of IA as involving trade-offs, compromise, power relations and vested interests (Cashmore, 2004).
- Introspection about what constitutes knowledge and how such knowledge is derived (O'Riordan, 1999).

Attending to how risk is constructed through discourse, by actors who take part in IA, is regarded as having a valuable contribution to make in respect of addressing challenges of this nature.

## Conclusion

The review of the origins of risk in the first part of the chapter shows how this concept has evolved from its roots in dicing, through the scientific-industrial revolution during the modern era, to something that is 'anyone's game' in the post-modern, fast-paced

and changeable world in which we now live. In this respect it is important to acknowledge significant developments in methods of risk prediction that support rigorous scientific investigation as a mainstay of IA. Notwithstanding these advances, it is nowadays impossible for risk computations to cater to the full range of possibilities, particularly given how natural and anthropomorphic sources of risk are becoming increasingly interwoven. Notwithstanding value driven influences over so much that happens in the world today, there is what Wynne (2002:463) refers to as a "constitutive thinking habit" tying practitioners and specialist advisors to the idea of risk as a primarily scientific issue. This interpretation is compatible with the system within which EAPs' activities tend to be constrained by institutionally defined assessment frameworks, but leaves less room for an appreciation of how "the social is built into risk" (Horlick-Jones, 1999:81). Alternative constructions of risk have been extensively debated and theorised in disciplines other than IA over many years. These perspectives offer valuable insights for the practice of IA.

In the next chapter risk is re-imagined as a product of discourse. This conceptual orientation opens opportunities to explore alternate theories of risk for IA drawing on the disciplines of psychology, sociology, and anthropology.

# Chapter 3

# Conceptualising risk as a product of discourse

The purpose of this chapter is to provide a framework for addressing my second research question by exploring the conceptual basis for alternative perspectives of risk as an organising principle for discourse. As can be inferred from the previous chapter, this way of thinking about risk is linked to wider scholarly critique of the rational model for science, and associated challenges when it comes to accommodating socially constituted forms of knowledge (see*, inter alia*, Elster, 2009; Funtowicz et al., 1998; Funtowicz & Ravetz, 1993, 1994, 2001; Jasanoff, 2012; Kahneman & Tversky, 2013; Kørnøv & Thissen, 2000; Nowotny et al., 2001; Oreskes, 2004; Renn et al., 2000; Sarewitz, 2004, 2007; Shapin, 1995; Tversky & Kahneman, 1974).

I begin the chapter with a brief explanation of the semantic properties of risk, before referring to some of the insights offered by corpus linguistic studies of how risk is used in contemporary speech. Accordingly, constructions of risk, although often divergent, stem from a basic combination of diagnostic features: association with harm, an object of value and the need for a strategy. In the second part of the chapter, I develop the idea of risk as discourse with reference to Foucault's notion of an inextricable relationship between discourse and power. My aim is to posit risk and its diagnostic features as part of a tripartite alliance with discourse and power, to warrant discourse analysis as an appropriate approach to unpack the meaning of risk for IA.

## Speaking of risk

An often-quoted learned American judge, appropriately named Learned Hand (1872 – 1961), once said that "words are like chameleons, which reflect the colour of their environment". This is particularly true of risk. A first step towards unpacking the complex character of risk and its vagaries, is to look to the semantics: Hamilton and colleagues (2007) assert in this regard, that a proper understanding of meaning requires attention to the smallest unit of analysis, in this case the word 'risk' itself. It

helps to be mindful in this respect that language is not static – words come into and disappear from the English lexicon as language evolves in response to what happens in the world. Consequently, meaning of words change over time in a linear, and sometimes circular manner where words may go in and out of 'fashion'. Inarguably the events of the 20th and 21st centuries have secured a place for risk in contemporary discourse not only in academia and professional fields, but also in everyday communication and conversation. Väyrynen (2021) notes how thick concepts, which is how Möller (2009) has categorised risk, are thought to "provide leverage" in debates concerning the nature of evaluative thought and talk and pose questions about whether there is "a robust fact-value distinction" (Väyrynen, 2021:n.p.). According to Wilkinson (2001:5), "it is now understood that we have become culturally disposed to express our anxieties in the language of risk". Nonetheless, as Blaxter (1999:23) points out, it is precisely because risk is a thick concept in academic terms, or a fashionable concept in laymen's terms, that we should not presume "that we are all talking about the same thing". Linguists have descriptors for words that have ambiguous (or chameleon like) qualities and two of these are relevant to risk.

The first descriptor is "polythetic", meaning an essentially open concept which consists of a chain of elements (Wittgenstein, 2009). These elements do not need to have common characteristics from one end to the other, but they do need to present some similarities. The phenomena on either end of the chain are, therefore, separate but linked by having shared features (Kermisch, 2012). In the case of risk, Rayner (1992) suggests that the polyethic 'chain' stretches between a scientific end and a societal end. The former is primarily concerned with measuring, or evidence, and the latter is primarily concerned with more abstract types of thinking or reasoning - distinct but linked via common elements. The polyethic quality of risk is a useful reminder that interpretations should not be categorised as correct/right or incorrect/wrong, rather that a range of plausible meanings occur along a risk "continuum" (Lupton, 2013b:49). This idea of a continuum is described in more detail in the next chapter.

A second descriptor for risk is "polysemic". The root of the word – "poly" meaning "many" – is the same as "polyethic", but the chain effect is not diagnostic. Polysemous

words “can *carry* different meanings” (Ravin & Leacock, 2000:1, emphasis added); but in such a manner that they can only be understood in context. One way in which risk functions as a polyseme is in its semantic versatility: it can be used as a noun, adjective or verb (for example: cancer is a risk; smoking is a risky habit; you risk getting cancer by smoking). The implications of the polysemous qualities of risk, is that meaning will be correlated with association. Association, defined by Boholm (2018:481), is the “the process whereby an agent establishes a connection between something, x, and the notion of risk”. Accordingly risk is *characterised* by association, which in turn, give clues to the speaker’s intentions. The author’s argument is that technological descriptors of risk tend to underemphasise what it is that risk gets associated with. In this respect, Jasanoff (2012:3) points to the extent of precedents for things going wrong that all carry “the trademarks of human overreaching”. Thus, as technology proves more unpredictable and error prone, so the political questions about who ought to have known better become more pressing (Jasanoff, 2012).

A key contribution to understanding risk by association is Fillmore and Atkins's (1992) seminal study of corpus data. Their analysis draws on a 25-million-word corpus of risk citations in everyday language, from which they extract 1770 examples of sentences featuring risk. Fillmore and Atkins specifically chose the word risk as a suitable ‘primer’ for a larger research effort toward developing a frame-based dictionary focusing on “individual word senses”, the relationship between these senses and how they are linked to cognitive structures (frames) (Fillmore & Atkins, 1992:75). This implies that a word’s meaning must be understood “with reference to a structured background of experience, beliefs and practices, constituting a kind of conceptual prerequisite for understanding” (Fillmore & Atkins, 1992:76-77).

Boholm (2016:30) provides a detailed account of risk-related research that has relied, directly or indirectly, on “frame semantics” (including Duffley & Arseneau, 2012; Entman, 1991, 1993; Hansson, 2010; Zaefferer, 2002 and Zinn, 2010). It is noted by Boholm (2016) that, although this research has been undertaken in different disciplines including media, health sciences and environmental management, three interlinked themes can be distinguished. First, is an emphasis on the constructive aspect of risk – there is an element of causal reasoning implying that a risk posed by

one party can represent a benefit to another. This duality is clearly reflected in the Chinese 'translation' of risk which comprises two symbols – one which means danger and another which means opportunity (Laroche & Yang, 2014). A second related indication is that risk will align with motives, knowledge, resources, and cultures, such that a government official, scientific expert or member of the public will perceive risk differently. Boholm's (2016) third observation aligns to my experience in IA, that incompatible standpoints on risk tends to fuel controversy. Drawing on linguistically orientated research, I suggest that the link between risk and discourse comes down to three diagnostic features: the potential for harm; something of value at stake; and the need for a strategy.

**Potential for harm**

Although the association between risk and harm may seem obvious, it is not entirely straightforward. As described in the previous chapter, earliest traces of ideas about risk suggest it was connected to gaming. This implies a type of risk-taking, motivated by what Lupton (2013b:25) describes as "the attempt to escape the banalities of everyday life". Notwithstanding the thrill or excitement than comes with certain thrill-seeking behaviours, the risk label is still applied to potential for negative outcomes. Hence the *primary* association is between risk and harm (Fillmore & Atkins, 1992). Whilst this overriding frame is fundamental, deeper insights from corpus linguistic data are offered via a range of secondary associations. These indicate what people see as common causes and potential outcomes linked to harm (Fillmore & Atkins, 1992:82-84). Such associations include "victim", "deed", "motivation" and "gain".

Similar associations are reflected in the findings of linguistic analyses reported by Zinn (2010). He interprets these associations as reflecting worries about decisions made by a more influential someone (or some social entity) and the implications for those with less influence (Zinn, 2010). In this regard, Douglas (1990:1) has referred to risk as having a "forensic" quality – in her view "a culture needs a common forensic vocabulary with which to hold persons accountable and…risk is a word that admirably serves the forensic needs of the new global culture".

What can be concluded from the association between risk and harm, is that risk is involves some kind of interaction between forces. Hence there must be something, someone or some group that is potentially overriding - that has the capacity to be more powerful than another. This applies in an instance of a person crossing a road, through to negotiating comprises and trade-offs in IA. In respect of the latter, Jasanoff (2007:33) points out "even the concept of the win–win solution assumes, in binary logic, that for each party to a game, winning and losing are the only options". This aligns toSlovic's (1999:699) suggestion that defining risk in itself is an exercise in power: "whoever controls the definition of risk controls the solution to the problem at hand". In respect of the potential for harm, there is also the burden of responsibility to comes with the resolutions – "there is no magical escape from the pangs of uncertainty that underlies our decisions" (Collins, 1992:167). What a several scholars (including Horlick-Jones, 1990, 1998; Jasanoff, 2012; Vaughan, 1996; and Wynne, 1996, 2002) have also highlighted is the extent to which mishaps and accidents have been traced back to routine, and taken for granted behaviours and approaches to assessing risk, creating what Vaughan (1996:392) has described as "a way of seeing" that is, simultaneously, "a way of not seeing".

**Something of value at stake**

A second important association with risk has also been confirmed in corpus linguistics analyses. Hamilton and colleagues (2007) have built on Fillmore and Atkins' study of risk associations, drawing from three linguistics corpora, again reflecting how risk is used in ordinary speech. Like its predecessor, this more recent study confirms risk's predominantly negative connotations. However, what this second study reveals, even more explicitly than the Fillmore and Atkins study, is an emphasis on actions, agents or protagonists which are associated with "bad outcomes such as loss of a *valuable* asset" (Hamilton et al., 2007:178, emphasis added).

Drawing on this association between risk and value in the environmental management context, Boholm and Corvellec (2011) have developed a "relational" model, distinguishing between "risk object" and an "object at risk". The model identifies the attachment of "value" as requisite for someone, some thing, or some way of being, to

be considered “at risk” (Boholm and Corvellec, 2011:177). These authors emphasise that the valued object can be understood, not only as something tangible, but any kind of physical, cultural or social artefact that can be delineated and placed under threat. They use the example of a nationalist ideology, but from an environmental perspective value may attach to a species, an ecological system, a sense of place, a feeling of wellness, or anything else that is either material, or symbolically construed.

The notion of value is also seen as diagnostic by analytical risk scholars including Aven and Renn (2009, 2018), Hansson (2010, 2018) and Rosa (1998). These scholars agree that there must be something perceived to have value and be at stake, for there to be a risk. In this respect it is interesting that synonyms for value include both “appraise” and “cherish” (*Oxford Paperback Thesaurus*, 2012). Risk analysts refer to “p-values” to signify probability in the context of a null-hypothesis, whereas social scientists refer to what people value. The addition of an “s”, converting value to plural (i.e. values), retains a numerical ‘sense’, but also expands the ‘people’ meaning to encompass principles, morals and codes of behaviour (Oxford Paperback Thesaurus, 2012).

Referring to the emergence of chemical, nuclear, and aerospace technologies in the mid-20$^{th}$ century, Wynne (2002:467) proposes that pioneering analysts had an “essentially clear idea of the object at stake” being human life or property. Methods and techniques could, therefore, be defined within “private technical debate”, without need for open negotiation and consultation about people’s values, or for that matter “about the object deemed to be the source of the risk” (Wynne, 2002:467). Nowadays the concept of value is far more nuanced, particularly in relation to principles of sustainable development underpinning IA. Clearly there are types of value that fall within the intellectual control of experts, but there are also the broader associations with value that society contributes.

#### Need for a strategy

In addition to the connotative meanings of risk that can be identified in corpus linguistic studies, there is another essential characteristic of risk that I alluded to in the discussion of the genesis of risk in Chapter 2. This has to do with risk offering the

prospect of a solution - a feature that is regarded as crucial by, among others, Dean (1999), Hillgartner (1992) and Rosa (2010). This can be described as the element of strategy – the need to a 'make-a-plan'.

Going back to the earliest renditions of risk, the strategic element has been distinguishable – the theologians referred to salvation, seafaring merchants were motivated by compensation. This tactical feature still applies across all kinds of risk assessment: the intuitive judgement one makes before crossing a road; the unscripted weighing of pros and cons when gambling or taking part in an extreme sport; or the more complex and relatively time-consuming analyses that specialists undertake in the context of IA and other disciplines.

Strategy is also key to organisational risk management relevant to how companies manage their affairs to protect against the unforeseen - guidance provided by standards including ISO 31000:2018 have relevance in this regard. These provides direction on how companies should integrate risk-based decision making into an organization's governance and structure in order to best protect their assets. When it comes to financial risk, the entire insurance industry, in all its forms, is a vast risk strategy, reliant on what Dean (1999:25) describes as "a way of representing events so they might be made governable in particular ways, with particular techniques, and for particular goals". The following extract from Foucault's theory of governmentality is particularly relevant to the strategic character of risk:

> *The tendency which, over a long period and throughout the West, has steadily led towards the pre-eminence over all other forms (sovereignty, discipline, etc) of this type of power which may be termed government, resulting, on the one hand, in formation of a whole series of specific governmental apparatuses, and, on the other, in the development of a whole complex of saviours* (Foucault, 2002:212).

The word "saviours" in this extract reinforces the pre-emptive qualities of risk that relate to protection, in respect of sources of harm and the object of value. In this respect, I found interesting a remark made in an 'on-the-ground' interview with an Australian firefighter, broadcast on Sky News (11 January 2020). In response to a question about how he felt about his job and the dangers it posed, he said that "we

need fear to make decisions". His comment, uttered in the face of an urgent and complicated circumstance, reflects a role for the dimension of time in discerning the type of strategies that are deployed in risk situations. Mairal (2008) believes there is a critical moment in "narratives of risk" which calls for a jump from calculative deliberation to moments in which new knowledge is created – "not being expert or institutional, but spontaneous and self-governing" (Mairal, 2008:53). This tends to happen once circumstances become less conducive to pre-supposition, and closer to the moment of real suffering, in which case emotions can be understood "as an advisor for decision making" (Zinn, 2006:4).

In the stakeholder engagement process that is integral to IA, we frequently observe what is tempting to label an 'emotional response' to a proposal, or NIMBYism. Cass and Walker (2009:62) are critical of such labels, opining that more powerful actors use this type of characterisation to "dismiss public concerns as being irrelevant to the sought after 'rationality' of planning". An alternate reading is to view emotion as a strategy in oppositional activism. One of the most forthright campaigners for the role emotion in understanding the strategic nature risk responses is Sabine Roeser (Roeser, 2006, 2011, 2012, 2017). This author's primary contention, couched in cognitive theory, is that emotions are a necessary part of judging the "moral acceptability of risks" (Roeser, 2006:689). Instead of the conventional interpretation of emotions as subjective projections, she argues that moral or emotional decisions are often "truth-apt" - reflecting the way the world is, rather than how some think the world ought to be (Roeser, 2017:37).

Following a similar argument, Wilkinson (2001) proposes that the condition of anxiety is a justified response to prevailing uncertainties that characterise the social and environmental conditions that many people are subject to. Rather than being an individual malady, within the "exclusive provenance of psychology or psychiatry", Wilkinson frames anxiety "as a function of larger changes in society" that contributes to a general sense of un-ease (Wilkinson, 2001:vii). This author also distinguishes anxiety from fear, such that the latter is linked to decision-making in a way the former is not - fear always has something in its sights, whereas anxiety "guarantees that there will be no final certainty, but always speculation" (Wilkinson, 2001:11). Returning then

to the example of the firefighter, the emotion involved in his reaction does not make him less qualified to respond. On the contrary, the fear frees him from anxiety, and becomes inherent in his tactical approach – the *strategy* that he relies on in a risky situation. In this respect O'Brien (2000) provides a helpful analogy which underscores both the role of emotion and the strategies it can produce, including one which could be labelled 'common sense'. Her example is also tangentially relevant to Roeser's concern about the moral parameters for decisions about risk:

> *Imagine a woman standing by an icy mountain river, wanting to cross to the other side. A team of four risk assessors stands behind her, reviewing her situation. The toxicologist says that she ought to wade across the river because it is not toxic, only cold. The cardiologist says she ought to wade across the river because she looks to be young and not already chilled. Her risks of cardiac arrest, therefore, are low. The hydrologist says she ought to wade across the river because he has seen other rivers like this and estimates that this one is not more than 4 feet deep and probably has no whirlpools at this location. Finally, the policy specialist says that the woman ought to wade across the river because, compared to global warming, ozone depletion, and loss of species diversity, the risks of her crossing are trivial. The woman refuses to wade across. "Why?" the risk assessors ask. They show her their calculations, explaining to her that her risk of dying while wading across the river is one in 40 million. Still, the woman refuses to wade across. "Why?" the risk assessors ask again, frustrated as she clearly doesn't understand the nature of risks. The woman points upstream and says, "Because there is a bridge"* (O'Brien, 2000:3).

Whilst developing this component of the thesis, I had an opportunity to test its potential in a mining-related workshop (described in Box 2). This involved simply prompting a discussion about risk in terms of the possibility of harm, the threat to something of value and the need for a strategy. From my interaction with the workshop participants, it was evident how this framing opened up alternative avenues for negotiating complicated and potentially controversial situations.

Building on the semantic indicators, the next part of this chapter focuses how risk is constructed "*in and through* processes of discourse" (Stallings, 1990:82, emphasis in the original).

**Box 2: Framing risk in the mining sector**

In 2019, a colleague asked me to address a workshop she was running for extension workers in the mining industry who were involved in building community relations. The focus of the workshop, at which several large mining companies were represented, was on risk management. Guided by an organisational management system for risk (as described in ISO 31000:2018), the workshop participants had spent time exploring various scenarios and how to plan accordingly. What was clear from the discussions up to that point was that the participants had pre-supposed a definition of risk from the perspective of the organisation, i.e., the mine owners. All possible events and outcomes to do with the work force considered only how the mine might suffer or benefit from a business (financial and reputational) perspective. My perception was that the mine workers and their families were, albeit inadvertently, framed as a potential threat to the industry. By presenting some alternative definitions, I invited the participants to reframe their perception of risk through the lens of the miners and their dependents – demonstrating that, for example, the prospect of job loss or being unable to provide for a family, met the same 'risk criteria' for community members, as for the mine – potential harm/suffering, an object of value and need for a strategy (e.g. striking or joining a union). The benefit inherent in this diagnostic was a notion of risk beyond the constraints imposed by the industry, enabling the participants to see risk as much of a prerogative of the mine workers and their dependents as of their employers.

## Constructing risk through discourse

The social constructionist epistemology for qualitative research assumes that the world can be understood in terms of historical and cultural specification, whereby knowledge is produced and sustained through social processes (Burr, 1995; Khan & MacEachen, 2021). The synergy between social constructionism and risk theory has been identified by Bradley and Morrs (2002). These authors suggest that risk theory allows social construction to go beyond general statements that knowledge is constructed, by looking more specifically at how subject matter is constructed "in this society", acknowledging what Beck (1997) has called "science of the everyday" (Bradley & Morss, 2002:510). Particularly in respect of environmental discourse, Alexander (2010) underscores the importance of interrogating texts to find deeper meaning:

> *A questioning perspective will see us attempting to get behind the text, to read between the lines. Employing rational thinking in these enlightened days does not permit us to take things at purely face value. Among other things, it entails discussing and disputing the substance and truth of opinions or propositions* (Alexander, 2010: 67).

By focussing on the rhetorical forms in which risk is depicted, this research embraces a post-structuralist emphasis on discourse, within social constructionism. In making this choice I am mindful that not all discourse analysis falls within these philosophical schools of thought. As Curtis (2014) explains, Fairclough (often referred to as the father of discourse analysis) was strongly influenced by post-structuralists like Foucault, but mainly in his earlier theories. Closer association with critical realism emerges in his later contributions to discourse analysis, developed in collaboration with Chouliaraki (Fairclough & Chouliaraki, 1999) and with Jessop and Sayer (Fairclough et al., 2002). Catering to what I identify as the 'intangibility' problem with risk in Chapter 2, the post-structuralist perspective conflates knowledge and reality, to a larger extent than the critical realist perspective. Thus, when it comes to risk, it is plausible to contend that there is no reality outside of discourse because risk does not 'exist' in a single physical form.

In this thesis I treat discourse as the vehicle by which meaning is allocated, in line with Dean's (1999) assertion that risk resides in the forms of knowledge that make it thinkable, and that these forms can range from statistics to sociology. Meaning is, consequently, dependent on how people perceive and understand opportunities and threats in the world around them (Runhaar, 2009). The implication is that risk is always in the making, "acquiring" different meanings (Lupton, 2013b:14). These meanings are important indicators of changing sociocultural, political and economic contexts, but the 'object', or consequence of risk, in a realist sense, remain elusive

Undoubtedly the process of constructing risk will reveal discrete and often incompatible priorities, leading to "conflicts within and between different authorial voices" (Agger, 1991:112). This is most plausible if one recognises the abstract quality of risk, allowing for the fact that people seldom share the same expectations or want the same thing from life. Inevitably risk is most readily appropriated by those who 'closest'

to the issue, or who have the most vested in the possible outcomes (Day et al., 2019). In this regard, Sandman (2012) points out that justified upset often masquerades as unjustified views about the risk, given the parameters/standards embedded in regulatory standards. He provides the following scenario to illustrate his view:

> *I might want to argue that it is morally wrong to let you put an incinerator in my neighbourhood against my will, especially since you kept your plans secret until the last minute and did not even answer my calls when I telephoned to complain. But if I want to defeat the incinerator, I have to argue instead that it threatens my family's health (and eventually I come to believe it). This encourages you to argue in return that the threat to health is minimal. Health becomes the ground of the debate; morality, coercion, secrecy, and courtesy become underground issues* (Sandman, 2012:11).

Coming from a sociological perspective on the same concern, Wilkinson (2001:39) believes that people are "being denied the proper social conditions for keeping themselves in good health". In this regard, he cites David Smail as follows:

> *Our subjective experience of the world tells us the truth about it, even if the language it has to do so is cast in forms we have come to see as symptoms. We live in anxiety, fear and dread because these constitute a proper response to the nature of our social world* (Smail, 1984:98).

Exemplified in these excerpts is Foucauldian theory of discourse as the location where "power and knowledge are joined together" (Foucault, 1991:100). As Joseph explains in respect of Foucault's perspective, the domain of human knowledge is full of power relations and knowledge develops, "not simply on the basis of trying to understand the world beyond it, but according to the dynamics of its practical, institutional and discursive context" (Joseph, 2004:145).

Drawing on the relationship between power and knowledge, scholars have proposed several formal definitions of discourse that distinguish it from being simply a way of speaking. For example, Jørgensen and Phillips (2002:61), describe discourse as a form of social practice which contributes to the constitution of the social world including social identities and social relations (emphasis in original). Hajer and Versteeg's (2005) definition of discourse is similar but more nuanced:

> *An ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomenon, and which is produced and reproduced through an identifiable set of practice* (Hajer & Versteeg, 2005:175).

Although on the surface of it, this second definition seems obscure, it can be simplified into three useful pointers toward the connectedness between risk, discourse and power. The first feature of the definition is its inclusivity of "ideas, concepts and categories" all of which are relevant to the polysemous character of risk in terms of its ability to carry different meanings. Second is that the study of discourse is relevant to objects ("physical phenomenon") and to events/behaviour ("social phenomenon"). Again, this can apply to both realist and value-based constructions of risk. A third feature of the definition is its emphasis on the rhetorical or emphatic quality of discourse ("production" and "reproduction"). Repetition breeds familiarity, which in turn, perpetuates or entrenches specific attitudes, opinions or practices. In this respect, Jørgensen and Phillips (2002) explain how a single perspective becomes "naturalised":

> *When a struggle takes place between particular discourses it sometime becomes clear that different actors are trying to promote different ways of organising society. At other times, our social practices can appear so natural that we can hardly see that there could be alternatives* (Jørgensen & Phillips, 2002:36)

What this observation highlights, also apparent in the example offered by Sandman (2012), cited above, is how the relationship between discourse and power can be explicit or implicit. Attention to discourse should, therefore, not only focus on what is said, but also what may be ignored/marginalised, or simply taken for granted. Unfortunately, time and budget constraints on IA processes, means that the stakeholder engagement, arguably too frequently, comes down to a question-and-answer session which does not allow room for all the issues and concerns to be thoroughly aired and debated. The Foucauldian idea of power diffused and embodied in discourse (Rabinow, 1991), means that argumentation is never simply about what is true or false - particularly in respect of environmental risks where nature cannot speak for itself. As Dryzek (2005:8) points out, there are also no "well-defined boxes labelled

radiation, national parks, pandas, coral reefs, rainforest, heavy metal pollution, and the like" -

> *When human decision systems (be they individuals or collective bodies such as governments) confront environmental problems, they are confronted with two orders of complexity. Ecosystems are complex, and our knowledge of them is limited, as the biological scientists who study them are the first to admit. Human social systems are complex too, which is why there is so much work for the ever-growing number of social scientists who study them. Environmental problems by definition are found at the intersection of ecosystems and human social systems, and thus are doubly complex.* (Dryzek, 2005: 8)

The intersection to which Dryzek refers is frequently characterised by an absence of consensus around what constitutes empirically verifiable facts (Price & Reus-Smit, 1998). Acclaimed historical novelist, Hilary Mantel, appropriately describes this lack of certainty as "the absence of fact that frightens people: the gap into which people pour their fears, fantasies and desires" (Mantel, 2010:331 from *Wolf Hall*). The knowledge that is contributed in this space has emotional as well as moral content and will inevitably be both fragile and contestable. The associated pitfall for producers of specialist knowledge is the tendency to engage in what Owens and Cowell (2003:50) have likened to an "arms race", whereby experts rush to with an intention to forestall conflict by mobilizing scientific arguments and rationalising actions. As will become clearer in the case study chapters, the problem with this approach is that sentiment can seldom be quashed, and resultant struggles are inevitably about winners and losers. What a view of risk as discourse can help explicate is that all interpretations are intertwined with contextual circumstances and most often revolve around trust and social values (Day & Patel, 2021). In the next section I expand on discourse analysis as a tool to uncover the effects of competing constructions of risk.

## Analysing discourse

The are several approaches to unpacking and analysing discourse. Boholm (2016) draws a coarse distinction between approaches that focus on linguistics (such as framing analysis), and approaches that focus more explicitly on the relationship

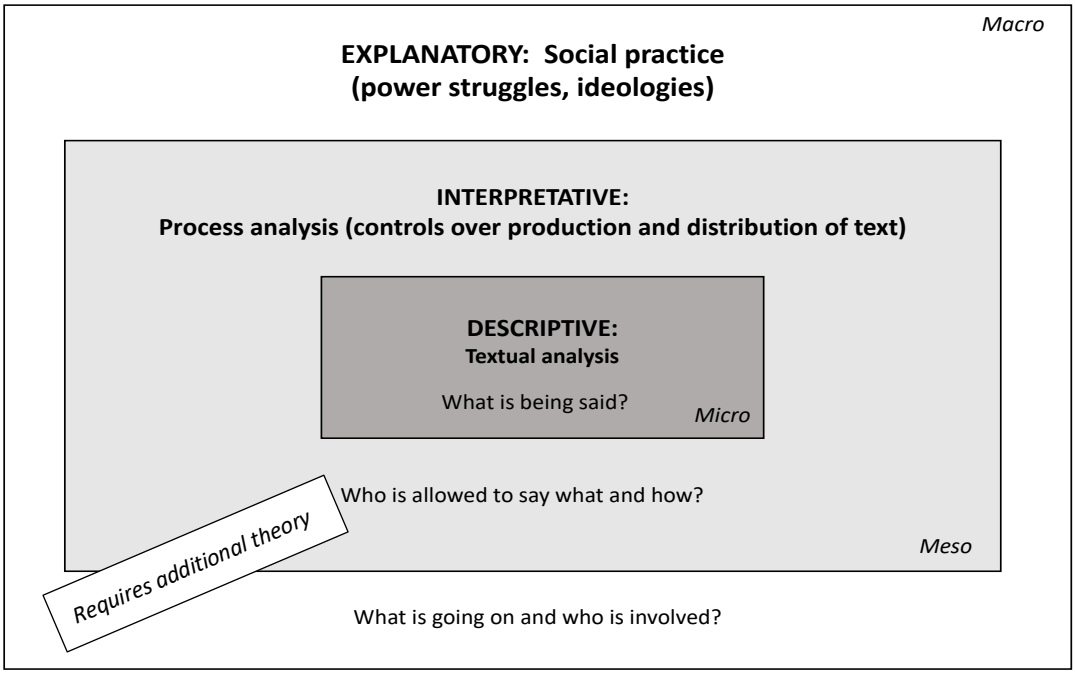
between “ideas, concepts and categories” and meaning attributed to “social and physical phenomenon”, as in Hajer and Versteeg’s (2005) previously cited definition of discourse. In the first part of this chapter, I provided a flavour of the linguistics approach, with reference to the semantic character of risk and the contribution of corpus data studies to the interpretation thereof. Discourse analysis differs, however, from analysis of discourse in the linguistic sense, in that it *necessarily* involves a critical stance towards a single truth (Boholm, 2016). As such, discourse analysis forms part of an interdisciplinary field of social constructionist approaches in which the Foucauldian idea of contested power relationships is integral (Jørgensen & Phillips, 2002).

Discourse analysis, in the Foucauldian tradition, should reflect two key intentions. It should “aspire to dissect, disrupt and render the familiar strange” (Graham, 2005:4); and “to engage in struggle to reveal and undermine what is most invisible in practice” (Ball, 1995:267). Other than the basic principles, there are no specific or diagnostic rules to which a Foucauldian discourse analysis should subscribe (Graham, 2005; Sharp and Richardson, 2001). There are, however, several distinct approaches that are, to a greater or lesser extent, influenced by the work of Foucault, including Fairclough (1992, 1993, 1995), Laclau and Mouffe (2001), and Potter and Wetherall (1987). Although each approach has attributes suited to exploring competing discourses, Fairclough’s approach, often referred to as Critical Discourse Analysis (CDA), is preferred for policy analysis “because it allows a detailed investigation of the relationship of language to other social processes, and of how language works within power relations” (Taylor, 2004:436). CDA is not procedurally prescriptive - it rather offers a three-dimensional framework for a systematic analysis which advocates attention, not only to the data (in respect of texts, images, symbols and so forth) but also to process and contextual influences (Fairclough, 1995; Janks, 2007; Jørgensen & Phillips, 2002).

The dimensions of CDA (depicted in Figure 1) include a textual component, focusing on language in use, an interpretive component, concerned with processes that frame and define the dispute. The wider explanatory dimension refers to the socio-political setting for the dispute. What is most important about these three dimensions is their

'embeddedness' within each other: the researcher can approach the subject via any of the dimensions, but the text cannot be isolated from societal and cultural processes and structures which, in turn, are shaped by power relations. CDA consequently has an 'identity' function (who is telling something about what), a 'relations' function (how can it be told) and an 'ideational' (why is it being told) (Fairclough, 1995).

Figure 1: Fairclough's three dimensions of Critical Discourse Analysis




As evident in my annotation on Figure 1, the model designed by Fairclough is both conceptual and methodological in character, but does not stand in for a theoretical framework: in CDA concepts, theory and method form a "complete package" embedded in a basic philosophy of language being integral to the "social construction of the world" (Jørgensen & Phillips, 2002:4). I unpack the 'package' in my Methods Chapter 5. Before doing so, I address the theory imperative for CDA in the next chapter.

## Conclusion

In this conceptual component of my thesis, I have sought to show how the discursive properties of risk, as a polyethical and polysemic word, do not tie it to a singular

definition. Notwithstanding this absence of semantic constraints, corpus linguistic studies indicate that risk has common diagnostic features. These include, firstly a potential for harm (even 'fun' risks are only labelled as risks if there is a potentially adverse outcome). Second, there must be an associated object of value that is worthy of protecting from harm; and thirdly, there is a strategic imperative referring to the tactics engaged to preserve value. Whilst nothing about these indicative properties exclude a realist interpretation of risk, they also allow for other possibilities when it comes to risk interpretations.

In essence this diagnostic opens up avenues by which risk may 'escape' the taming influence of probabilities and become 'available' to be discursively transformed. Of particular interest concerning my second research question is how distinct claims to knowledge, represent alternate ways of understanding risk. CDA provides a structured way of unpacking this process. In the next chapter I outline three distinct theories that form part of the "complete package" that constitutes risk as a product of discourse. Each theory offers a lens for explicating the non-discursive/explanatory dimensions of CDA in each of my case studies (Chapters 6-8).

# Chapter 4

# Framing risk as a social, psychological and cultural phenomenon

In this Chapter, I take a deeper dive into alternate meanings for risk by examining three theoretical models. These theories are subsequently used to frame the study of the three cases of IA presented in Chapters 6 – 8. As indicated in the previous chapter, this theoretical framework is an essential component of the methodological package that comprises discourse analysis:

> *Discourse analysis is not sufficient in itself for analysis of the wider social practice, since the latter encompasses both discursive and non-discursive elements. Social and cultural theory is necessary in addition to discourse analysis* (Jørgensen & Phillips, 2002:69*).*

The theories outlined in this chapter have their roots in the respective fields of sociology, psychology and anthropology. Accordingly, each theory is distinct, but features on a continuum, from a realist interpretation of risk at one end of the spectrum towards a highly constructivist perspective on the other. Together they contribute an alternative non-realist view of risk, which I discuss in a co-authored paper published in Environmental Impact Assessment Review (Day et al., 2019). I begin this chapter with a brief overview of the risk continuum, followed by a more detailed account of the three theories. I conclude the chapter with a comparative summary of the attributes of each theory and their relevance to discursive constructions of risk.

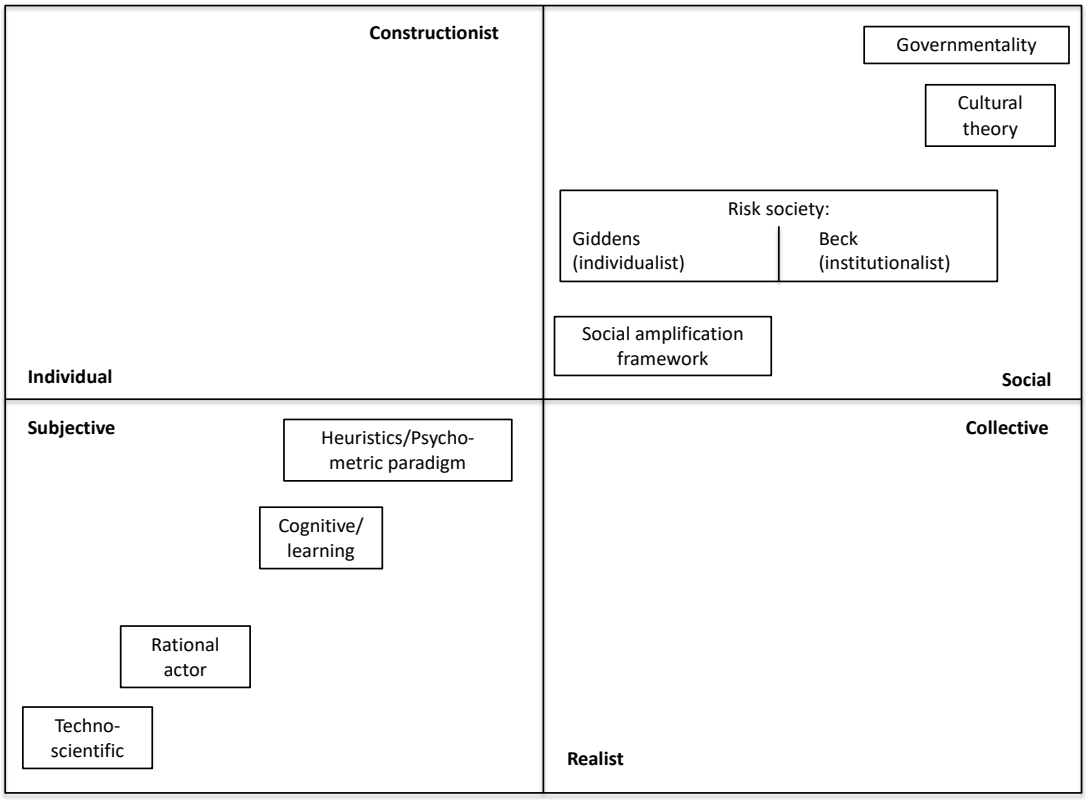
## The realist-constructivist continuum

In the literature offering alternate theories of risk there are some scholars who develop their ideas from a dualistic perspective – for example, Blastland and Spiegelhalter's (2014:5) depiction of risk as "impassive, formal, calculating" on one hand, and "full of human hopes and fears" on the other. A more nuanced way of conceptualising the hybrid qualities of risk is along a continuum, from techno-scientific (realist)

formulations on one end of the spectrum, to socio-cultural (constructivist) interpretations on the alternate end (see Lupton, 2013b). This second proposition is similar but, arguably, more versatile than a dual-risk interpretation because it is less binary. As indicated in Chapter 2, the IA literature reflects an over-arching commitment to the realist perspective of risk, aligned to what is expected in an institutional context for the discipline. The idea of a continuum implies that the techno-scientific definition of risk stemming from realist theory, and the socio-constructionist notion of risk can hold positions opposite one another, acting act as reference points for in-between theories, rather than being viewed as two distinct categories.

Figure 2 illustrates the risk continuum, from "realist" to "constructionist" on one axis, and also "individual" to "collective" on the other. The depiction that I have adapted here is according to Taylor-Gooby and Zinn (2006:397), based on their comprehensive review of "directions in risk research".

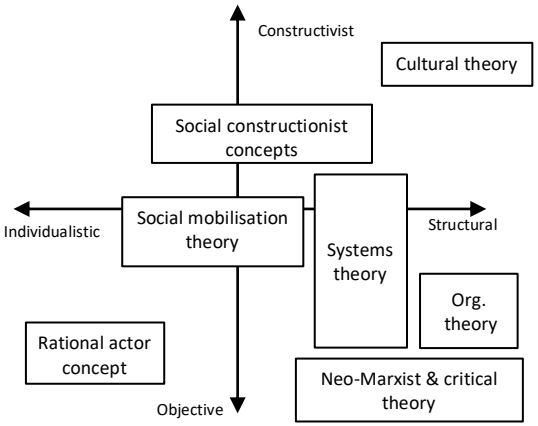
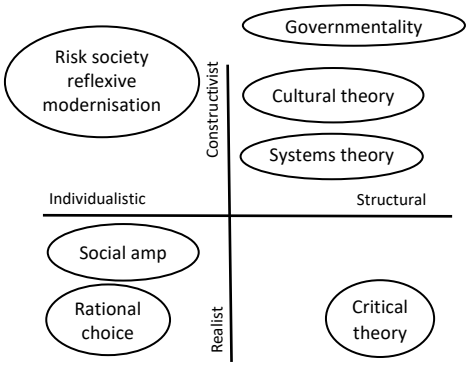
Figure 2: Risk models and theories (adapted from Taylor-Gooby & Zinn, 2006:407)



Numerous scholars have contributed to the categorisation and arrangement of alternative risk theories, and variations of the scheme in Figure 2 have been presented by, among others, Renn (1992, 1998, 2008), and Horlick-Jones and Sime (2004). I have highlighted contributions by key scholars in the overview provided in Table 1. The information indicates that authors are not all agreed about the main theories and where they are situated on the risk continuum. There is, however, consensus regarding the primary distinctions between categories of realist opposite constructivist, and individual opposite collective (even if they are labelled differently). Whilst the real-constructivist dimension reflects the level of abstraction, the second dimension, individual-collective, refers to the emphasis theorists have placed on personal versus community/group perspectives.

Another point on which scholars agree is that risk is construed along discipline lines. Engineering and physical scientists are inclined toward the realist end of the spectrum, treating risk as a functional relationship between probabilities and consequences (for example, Aven, 2012a; Carpenter, 1995; Suter et al., 1987; Suter & Cormier, 2008). Conversely, social scientists are drawn to the nuanced and discursive qualities of risk, because they are interested in how people interpret and respond to change, particularly in situations where there is uncertainty (for example, Jasanoff, 1993, 1999, 2012; Mairal, 2008, 2020; Wynne, 1992, 1996, 2002, 2006).

Table 1: Scholarly reviews of alternative theories of risk

| Author | Reviewed theories | Theory classification (epistemology) | Preference / bias |
|---|---|---|---|
| Krimsky, (1992) in Krimksy and Golding (eds) (2002) | Contribution represents a first production of a taxonomy of theories, including the two dimensions reproduced in subsequent works. Three 'paradigms' are distinguished:<br>• Social<br>• Psychological<br>• Cultural<br>Several theories are referred to in each paradigm. Risk society receives relatively little attention, compared to the psychometric approach and cultural theory. | The classification is intended to be descriptive. Cultural theory is classified as strongly constructivist and structural. Systems theory refers to Marx and the psychometric approach is subsumed within the rational actor concept classified as "objective" and individualistic.<br>  | Krimsky's contribution is intended as an initial exploration of ways to develop a risk taxonomy. There is considerable emphasis on the technical and economic 'roots' of risk theorising, compared to later contributions which see a shift in emphasis to the more strongly constructivist theories in which cultural theory shifts to a 'weaker' constructivist position and "objective" is replaced with realist. |
| Renn (2008, 1998) | **Rational theories**<br>Rational choice / rational actor theory<br>**Sociocultural theories**<br>• Risk society and reflexive modernisation<br>• Luhman's Systems theory<br>• Critical theory<br>• Cultural theory<br>• Foucault's Governmentality theory<br>• Psychological theory<br>• Social amplification | Approaches classified on two dimensions: constructivist - realist; individualist – structural.<br>  | Renn provides an even account of rational, sociocultural & communication theories suggesting that each plays a part toward an integrated approach to risk governance. Research interest also includes risk communication, public involvement and risk management strategies, linked to the alternate theories. |

| Author | Reviewed theories | Theory classification (epistemology) | Preference / bias |
|---|---|---|---|
| Lupton (2013b) and with Tulloch (Tulloch & Lupton, 2003) | **Sociocultural theories**<br>• Risk society and reflexive modernisation<br>• Cultural theory<br>• Foucault's Governmentality theory | Theories are classified, in tabular format, on a single dimension from realist to constructivist. Accordingly:<br>• Techno-scientific interpretations (with which cognitive/psychological approaches are associated are realist.<br>• Risk society is weakly constructivist<br>• Cultural theory sits between weakly constructivist and strongly constructivist<br>• Governmentality is strongly constructivist. | Lupton is critical of cognitive (psychological) approaches relative to constructivist theories – in her view psychometrics is aligned to the realist approach to risk, reflecting the 'deficit model' of public understanding of science (see Irwin et al., 1996). Her views are closely aligned to the tenets of cultural theory. In later work, Lupton explores how the interaction between emotion and risk may provide avenues for new theoretical perspectives (edgework). |
| Wilkinson (2001) | Wilkinson's critique of risk theory focuses on the risk society and cultural theory, but includes and appraisal of the psychometric paradigm. | Wilkinson suggests that risk society and cultural theory both conceive of reality as a social construction but ascribe different political motives to each theory. Accordingly, Beck is motivated to expose the 'technical elite' whereas Douglas is concerned with maintaining balance between contrasting perspectives of risk. Psychometric research is held up as a flawed but useful, empirically based, approach to reveal the complexity of risk responses. | Wilkinson is critical of the partial accounts offered by risk society and cultural theory, partly because they appear to be more of a political commentary than actual theorising about risk consciousness, and also because they are too abstract and lack empirical verification. Wilkinson (2001:16) supports a discourse focused approach to understanding constructions of risk focusing on the "extent to which people acquire and create interpretations of 'hazards' and 'risks' in the context of a discursive process". |
| Strydom (2002) | Strydom develops a wide taxonomy which covers early background theories of human ecology to theories of modernity. His categories include human ecology, rational choice theory, cultural theory, systems theory and the theory of modernity (including risk society, reflexive modernisation and governmentality) | Theories classified, in tabular format, from realist to constructivist. Accordingly:<br>• Risk society and reflexive modernisation are classified as weak constructivism/constructivist-realism<br>• Rational choice, cultural theory, systems theory and governmentality are classified as strong (naïve) constructivism. | Strydom is supportive of Beck's theory of the risk society. His research is orientated toward rethinking the risk society and reflexive modernity perspective in conjunction with Habermas's critical theory, in an approach he calls 'socio-cognitive' critique. |

| Author | Reviewed theories | Theory classification (epistemology) | Preference / bias |
|---|---|---|---|
| Zinn (2009, 2010) | **Sociocultural theories**<br>• Risk society and reflexive modernisation<br>• Cultural theory<br>• Foucault's Governmentality theory | Theories classified, in tabular format, from realist to constructivist. Accordingly:<br>• Systems theory, governmentality and cultural theory are constructivist<br>• Risk society is realist and constructivist. | Zinn adopts a comparative approach but does not favour one particular theory over another. He is critical of the 'one dimensional' framework pitting realist against constructivist. He, therefore, also compares the aims and contributions of the respective theories in relation to knowledge, rationality, values, power and emotion. |
| Taylor-Gooby and Zinn (2006) | Offer a primary distinction between:<br>• Psychological approaches (psychometric paradigm); and<br>• Sociocultural theories (cultural theory, risk society and governmentality). | Approaches classified on two dimensions: constructivist - realist; and individual (subjective) – social (collective) (see Figure 2 in main text).<br>• Cultural theory and governmentality are positioned as strongly constructivist<br>• Risk society perspectives and psychometric approaches are both weakly constructivist.<br>The reason for the unusual classification of the psychological approach as constructivist is as follows:<br>"Psychometric approaches start out from an empiricism that is explicitly agnostic on the realism of risk, although a degree of realism is usually in practice assumed" (Taylor-Gooby & Zinn, 2006:408). | In Taylor-Gooby and Zinn's framework (reproduced in the main text) each theory is recognised for its individual contribution to overall theorising. The potential of 'integrated models' (specifically the Social Amplification of Risk Framework) is recognised. |
| Mythen (2008) | **Sociocultural theories**<br>• Risk society<br>• Cultural theory<br>• Foucault's Governmentality theory | Theories classified descriptively with reference to Lupton (1999). Accordingly:<br>• Risk society is described as realist<br>• Cultural theory described as 'solidly' constructivist<br>• Governmentality is described as 'strongly' constructivist. | Mythen underscores the individual contributions of each sociocultural theory to perceptions of risk and applies them to a single case study: the rise of Islamic terrorism. Mythen's other contributions to risk scholarship reflect a preference for Beck's risk society theory (with Burgess et al., 2018; Mythen, 2004, 2007, 2008) |

| Author | Reviewed theories | Theory classification (epistemology) | Preference / bias |
|---|---|---|---|
| Brown (2013, 2014) | **Sociocultural theories**<br>• Risk society and reflexive modernisation<br>• Cultural theory<br>• Foucault's Governmentality theory<br>• Luhmann's Systems theory | No formal classifications. Theories described as follows:<br>• Risk society is constructivist but sees risk perceptions as "objectively" validated<br>• Cultural theory is highly constructivist<br>• Governmentality linked to risk society, but more constructionist<br>• Luhmann's theory not classified. | Brown highlights the usefulness of cultural theory, in terms of its typological "neatness" and depth of insights. The risk society and governmentality are indicated as being more polemical and therefore, less attractive for practical research purposes. Luhmann's systems theory is described as broad ranging and sophisticated, but limited by its complexity. |

### Realist/individual dimension

As depicted in Figure 2 the realist perspective of risk aligns to individualism - the assumption being that individuals can take a stance, independently of cultural, social and political influences:

> *They are portrayed as free actors who are constrained only by their ignorance about the threat to which they may be exposed or their lack of self-efficacy in feeling able to do something about a risk. So too, risk and behaviours that are associated with such risks are themselves singled out for attention… as often separated from other risks and behaviours* (Lupton, 2013b:32).

From this description it can be appreciated that the realist perspective matches the commitment on behalf of practitioners and specialists to a sense of neutral detachment from the issues. Retaining this sense of detachment, is owed to confining risk "to the laws of mathematical logic and scientific method" (Bell & Mayerfeld, 1999:2). This allegiance is underpinned by a certitude that the acquisition of scientific information and evidence, can settle uncertainty and ease anxieties (Wilkinson, 2001). The realist perspective, is accordingly directed at the physical attributes of an entity and its potential to change - risks are framed as conceivable and, therefore, amenable to delineation through scientific measurement (Lupton, 2013b; Renn, 2008). Horlick-Jones (1998:79) has referred to the realist approach as directed at "material artefacts". By focusing on the magnitude and consequences of possible outcomes (as if they have already occurred) the intention is the potential for harm to a level which can be reasonably managed/mitigated. As intimated in the previous chapter, such calculations are done on supposition that stakeholders will place their trust in expert predictions and have confidence in their ability to curtail or limit negative outcomes.

### Constructionist/collective dimension

The constructivist outlook acknowledges social or collective influences – that which is inherent and cannot be altered or corrected via application of customary tools of scientific analyses. These include the psychological influences, and the social and cultural contexts by and in which risk is understood by public stakeholders.

Associated theories are inclined to treat risk as an abstraction, intangible and 'existing' only in the process of discourse (Lupton, 2013b).

The discursive production of risk can be linked to specific sources of harm, but wider contextual factors come into play that are tied to both the value and strategy features of risk. It follows that the risk of one thing is likely to be interpreted amidst other concerns and social disruptions that affect people's daily lives in relation of sources of harm, objects of value and need for a strategy. Examples of issues that influence constructions of risk in a contemporary context may relate to personal perceptions, and to the broader socio-economic-political context (Wilkinson, 2001). Such may include financial worries; pressing environmental crises; bewildering influence of social media and computer technologies; job insecurity; spread of disease; breakdown of moral communities and demise of the nuclear family; crime; racism; gender inequality; graphic portrayals of violence in the media; political instability; and so on. Many of these concerns are linked to a general sense that something is wrong with the "quality of our experience of day-to-day life" (Wilkinson, 2001:5). In this respect the social is *built into* the risk object (Horlick-Jones, 1998:80, emphasis added). Inevitably, a resultant sense of angst is coupled with misgiving about the ability of experts and decision-makers and, as Weston (2004) proposes, an overall loss of confidence in 'progress'. Accordingly, constructivist theories assume a discursive production of risk that cannot be formulated independently of emotions, values, perceptions, intuition, as well as an instinct for self-preservation.

## Alternative theories of risk

In the remainder of this chapter, I outline three theories which comprise a multi-perspectival framework for the corresponding three case studies. Notwithstanding distinct disciplinary backgrounds, their authors share an interest in environmental risks and the responses they provoke. The theories include:

- Ulrich Beck's sociological theory of the risk society (Beck, 1992, 1995, 1998, 2006)
- Paul Slovic (Slovic, 1986, 1999, 2000) and with colleagues' (Slovic et al., 2004, 2007) psychological theory and the psychometric paradigm

- Mary Douglas's cultural theory (Douglas, 1982, 1985, 1990, 1992, 1999, 2002) elaborated with Wildavsky (Douglas & Wildavsky, 1982); and Thompson and colleagues (Thompson et al., 1990).

The important contribution that these three theories have made towards the meaning of risk has been confirmed by several scholars, as evident in Table 1. I draw on some their reviews in my presentation of each theory, beginning with Beck's Risk Society, following by Slovic's psychological approach, and concluding with Douglas's cultural theory. In the discussion of each theory, I provide a general overview before highlighting key aspects of the theory relevant to the interpretation of risk in IA. I follow this with a critical appraisal, and a reflection on the classification of the theory relative to the opposing ends of the spectrum on the risk continuum.

## The social phenomenon of risk

The social phenomenon of risk is underpinned by the theory of a risk society. The key tenets of the theory are described below. Its usefulness for explicating risk from a social perspective in demonstrated in Chapter 6 using the case study of a specialist risk assessment for a bulk fuel storage terminal at Cape Town Harbour. The reasons for choosing this case are explained in Chapter 5.

### Background to the risk society theory

Risk society theory was conceived by German philosopher, Ulrich Beck, and first presented in a book titled *Risk Society: Towards a New Modernity* (1986, trans. 1992*)*. In excess of 80 000 copies were sold, making it one of few academic texts to feature on a "bestseller" list in Germany with its popularity largely attributed to timing (Renn, 2008). In the latter part of the 20$^{th}$ century, a series of health and safety disasters and near misses culminated in 1986 with the shocking meltdown of the Chernobyl nuclear power reactor in the Ukraine. This was preceded, just three months prior, by the disintegration of the *Challenger* space shuttle, 73 seconds after lift-off, which ended the lives of the seven astronauts on board. Other tragedies within the same decade included the Bhopal gas leak in 1984 that killed thousands in India, and the partial meltdown of a nuclear reactor at Three Mile Island in the United States in 1979.

Unsurprisingly, such events fuelled widespread doubt about the safety and reliability of the so-called large-scale technologies that had emerged from the industrial revolution of the eighteenth and nineteenth centuries, including aeronautics, the chemical industry and nuclear technology:

> *Risk perception studies and investigations of popular attitudes to technologies showed that people were concerned about the environmental and health-related impacts of large-scale technologies…most Americans, as well as Europeans, were convinced that large-scale technologies such as nuclear power and waste incinerators were necessary, but highly unwanted, manifestations of modernity* (Renn, 2008:53).

Otway and von Winterfeldt (1982) refer to opinion polls at this time, indicating that whilst engineers and scientists were credited with knowledge and problem-solving capacity, they did less well in "the human warmth and motivation stakes" (Otway and von Winterfeldt, 1982; quoted in Renn 2008:53). Ulrich Beck's notion of a risk society consequently resonated with many who were growing uncomfortable with the human and environmental cost of technological 'progress'. According to Strydom (2002:29), Beck's contribution was instrumental in shifting the "trajectory leading from classical safety research and the expert debate about risk assessment in the 1950s and 1960s, to a full-fledged public discourse about risk and risk-related matters". Whilst this discourse was unfolding in Western Europe, in the US there was also a growing demand from citizens to "do something about the environment" (Caldwell & Shrader-Frechette, 1993). With the spread of polluting industries and a visible deterioration in environmental quality "a concerned public was demanding preventative action mandated by law" (Caldwell, 1998a:9). As noted in Chapter 2, this call was primarily driven by unease about potentially high risk issues - "pesticides, oil spills, and nuclear fallout" – prompting the formulation of IA requirements in NEPA (1969) (Caldwell, 1988b:76).

#### Key tenets of the risk society theory

The mainstay of the risk society theory is a categorisation of risk associated with pre-, simple, and post-modernity (Beck, 1992:20–24). The first type of pre-modern risks are allocated in the risk society theory to non-human generated 'natural' hazards. These

hazards were not linked to technological-economic decisions and could be externalised onto nature or 'the gods'. With the advent of industrialisation, what Beck calls "simple-modernity", dangers are prescribed into self-imposed risks. According to Beck, these types of anthropomorphic risks "make their appearance on the world stage when God leaves it" (Beck, 2006:333). Although there may be undesirable outcomes, such risks can still be weighed up against the benefits and opportunities offered by the products of industry. They also tend to be confined to a limited number of people and constrained by calculable levels of exposure, making it possible to insure against their effects. Beck uses unemployment, workplace accidents and traffic accidents as examples of simple-modernity type risks (Mythen, 2004).

The focus of Beck's theory converges on the third category of risk – that which is linked to modernity by virtue of it being a product of this era. What would typically be labelled post-modernity, is referred to by Beck and colleagues as "reflexive modernity" (Beck et al., 2003:1). The term, reflexive in intended to convey a backlash type effect - where modernity is both confronted with itself and forced to deal with itself. Sørensen describes this boomerang effect as modernity "cast back towards itself, like light that has struck a reflector is cast back towards its source" (Sørensen, 2018). Under conditions of reflexivity, the environmental costs of industrialisation outweighs associated benefits. In other words, the unknown unknowns embedded in the side-effects (the externalities of industrial processes) are more common than known unknowns. The result is a society that is increasingly occupied with "debating, preventing and managing risks that it itself has produced" (Beck, 2006:332). Reflexive risks represent the "*anticipation* of catastrophe" (emphasis in the original) (Beck, 2006:332), leading to circumstances that Beck's equates to "living on the volcano of civilization" (Beck, 1992:19).

Risks constituting "the volcano" overshadowing a "world risk society" (Beck, 2006:329) are distinguished by several features. The first is an absence of individual choice, referring to how industrial risks are borne by a discrete few, enabling the general populas to benefit from a contemporary lifestyle. The second is a lack of confinement of risks in time or space, placing them beyond reach of traditional insurance economics. Linked to this is the invisible and insidious nature of the

dangers - chemical pollutants, radioactivity, genetic material - which evade human perceptive abilities, meaning that people have little choice other than to rely on expert inference (Beck, 2006). Finally, the imperative to avoid risk altogether has been replaced with an intent to distribute risk amongst the populas, through the deployment of "acceptable levels" (Beck, 1992:64).

This last characteristic is relevant to how risks are managed according to thresholds of tolerability, a practice familiar to scientists and IA practitioners. Such levels are depicted in the UK's HSE tolerability framework (Kletz, 2003; also described in Bandle, 2007). These have become the standard for many prescripts and norms throughout the world relating to air quality, waste, water quality, chemical concentrations, and so on. Whilst these are intended to embrace a precautionary approach, from Beck's perspective, "acceptable levels" is a means of circumscribing risk - giving permission to "to poison nature and mankind a bit" (Beck, 1992:64). This fits with what Wynne (2002:463) has labelled "back-end" accountability: despite the accumulation of 'bits of poison', standards are institutionally normalised, provided they are individually met nobody is deemed responsible for cumulative environmental and health effects. In Wynne's view, the invocation of tolerable levels tends to conceal motivations linked to political or economic agendas, rather than "proper human purposes and conditions" (Wynne, 2002:646). Thus, in the context of the risk society, objectivist accounts of risk are inevitably tied, in one way or another, to politics, power and morality -

> *Risk is not reducible to the product of probability of occurrence multiplied with the intensity and scope of potential harm. Rather, it is a socially constructed phenomenon, in which some people have a greater capacity to define risks than others* (Beck, 2006:333).

Adopting a Foucauldian perspective in their research on the organisation of risk, Hardy and Maguire (2016:2) describe "a dominant discourse of risk" that "privileges certain forms of knowledge" and authorises "certain risk identities" over others. The work of Maarten Hajer on policy development is similarly focused on how certain relations of dominance are structured and reproduced (Hajer, 1995, 1996, 2004). Utterances that do not conform to, or further the dominant discourse, fall outside of

what can be meaningfully said. From Beck's critical perspective a select group of experts are entitled to "decide about data, knowledge, proofs, culprits, and compensation…determining whether hazards can be anonymised and covertly spread" (Beck, 1995:130).

### Relevance of the risk society theory to IA

IA tools clearly fall within the purview of Beck's denunciation of approaches by which experts adopt a definition of risk as a basis for decisions made on behalf of those who live in the shadow of his metaphorical volcano. In this respect Beck refers to a "pattern of policy-making" which is "similar whether in the fields of air, water or noise pollution" (Beck, 1995:117): general policy and procedure is defined in law, the grey literature provides the detail (guidelines and standards), the scientists follow the prescripts, and the administrators decide and implement the course of action. In the risk society this "delegatory formula" acts as a "revolving door between democracy and technocracy" (Beck, 1995:117), whereby "a small group… actually decides the conditions under which people live" (Beck, 1995:118).

Although this would seem to imply a kind of dictatorship, Beck makes the point that technologists and scientists have not actively sought power. Instead they have simply continued to do what they did under conditions of modernity without recognising and following changes in circumstances under conditions of reflexivity. Experts continue to implement customary approaches to measuring and assessing risks, without acknowledging the extent to which their predictions are compromised by uncertainty, and associated low level of public trust in scientific knowledge:

> *(E)xperience of the past, encourages anticipation of the wrong kind of risk, the one we believe we can calculate and control, whereas disaster arises from what we do not know and cannot calculate..(t)he experience of global risks represents a shock for the whole of humanity* (Beck, 2006:330).

With specific reference to IA, Weston (2004) echoes Beck's sentiment, suggesting that the discipline is trying to function as it did, but in a context in which stakeholders no longer subscribe to a 'science as savior' type sentiment. Fifteen years after Beck's

proposition of a risk society in his article titled "Keep it Complex", published in *Nature*, Stirling (2010) writes as follows:

> *Worldwide and across many fields, there lurks a hidden assumption about how scientific expertise can best serve society. Expert advice is often thought most useful to policy when it is presented as a single 'definitive' interpretation. Even when experts acknowledge uncertainty, they tend to do so in ways that reduce unknowns to measurable 'risk'* (Stirling, 2010:1029).

Stirling goes on to frame risk as key to the way policy-makers are encouraged to pursue (and claim) scientific risk-based decisions, such that they avoid or are "denied exposure to dissenting interpretations and the possibility of downright surprise" (Stirling, 2010:1029). In this respect Beck, with Bonss and Lau, describe "progress" as a "process of demystification that can continue without limits", based on a belief that "scientisation can eventually perfect the control of nature" (Beck et al., 2003:5).

### Critical appraisal of risk society theory

Naturally debates about risk in general have evolved since Beck's initial presentation of the risk society in the late-1980s/early-1990s. Valid questions have been asked about the ongoing relevance of his theory, and whether his predominantly "technophobic" hypotheses can do justice to the "complex issues of the politics of risk" (Renn, 2008:66). Several critics have questioned the blunt distinction Beck makes between natural and man-made hazards which, it is argued, does not stand up to scrutiny of historical events. Wilkinson (2001) for example, denounces Beck's apparent conviction that there is something distinctively new about risks created by industrial modernisation which sets them apart from anything else. Listing many century old examples of 'manufactured' and 'natural' hazards, Mythen (2007) agrees that Beck's presentation of a unique historical phase characterised by a particular type of risk is misleading. In his opinion the natural and the social have always been intermeshed.

Another criticism of risk society theory focuses on Beck's argument about the diffuse, expansive nature of the 'new' risks. One of Beck's more controversial claims in this

regard is that "poverty is hierarchic, smog is democratic" (Beck, 1992:36). As Mythen (2004) points out:

> *(T)he idea of a universal axis of risk distribution appeals to the egalitarian principles of western academics. However, it may be less palatable to those living against the hard edge of environmental risk in Beijing and Sao Paulo. For these global citizens, the suggestion that 'smog is democratic' may prove a little hard to swallow* (Mythen, 2004:51-52).

Rather than risk as a universalising principle, risk society critics have maintained that poverty magnetises risk (Renn, 2008), as shown to be true in respect of the economic impact of the COVID-pandemic, as well as inequitable distribution of vaccinations between wealthy and poorer nations.

Mol and Spaargaren (1993:431) are among several critics who blame Beck's dramatic and apocalyptic account of a risk society for contributing to "ecoalarmism", thereby undermining the invaluable role of science and technology in problem solving. This concern is perhaps the most debatable aspect of the risk society theory - whether or not Beck's want to undermine "scientific managerialism" is a valid strategy (Burgess et al., 2018:3)? Inarguably, institutionalised science needs to confront the reflexivity that the risk society theory highlights, but it is also understandable that some are discomfited by Beck's wholesale portrayal of scientific risk analyses as "an ideological strategy to sell unacceptable risks to the public" (Renn, 2008:29). When it comes to probabilistic risk assessment, Beck's critics offer convincing arguments in support of model-based, coherent ways of presenting data on the relative potential for harm associated with new technologies and developments (see Aven, 2010, 2012a, 2016; Burgman, 2005; Renn, 2008).

Undoubtedly, the response to the COVID-19 pandemic and the rapid development of vaccinations has highlighted both the benefits and vulnerabilities of scientific advances. This also points to a final problematic presumption of the risk society theory is that scientists, politicians and lawmakers belong to the same cohort, or what Wynne (1996:5) names the "*vanguard intelligentsia*". Although policy making regimes do exist, there are also instances in which role players seek to address potential power imbalances in terms of their function and purpose – policy makers may look to the

science to fill gaps in information, whereas scientists may conclude that knowledge is insufficient for decision-making (Hajer, 1995:225). Specifically in respect of IA the South African experience shows that lawmakers, the judiciary in particular, can offer a moral voice of authority, which often contradicts the findings or opinions of experts and/or institutions (Day & Patel, 2021).

Despite valid criticism of the risk society theory, many researchers still hold Beck to be one of the most influential academic scholars on the topic of risk up to the date of his death in January 2015 (for example, Bergkamp, 2017; Elliott, 2002; Jarvis, 2008; Lash, 2015; Mythen, 2007; Sørensen, 2018; Strydom, 2002; Wilkinson, 2001; Zinn, 2004). The fact that Beck continued to develop his ideas in response to evolving concerns including acid rain, climate change, electromagnetic emissions and genetic modification, has helped to retain his status as topical figure for risk researchers. Furthermore, equivalent 'black swan' type events, that originally stimulated the risk society theory, have also contributed to sustained interest in the notion of a risk society. Events that have been explored through a risk society lens include the Fukushima nuclear disaster (Kersten, 2012; Sato, 2016), the 9/11 terrorist attack in New York (Spence, 2005) and the BSE crises in the UK and Europe (Oosterveer, 2002). Most recently, Tooze (2020:n.p.) has referred to Beck as "the sociologist that could save us from Corona virus", claiming that the relevance of Beck's ideas is even more apparent in our day than they were in his own.

#### Locating the risk society theory on the risk continuum

The position of risk society theory on the continuum between the realist and constructivist ends has been a source of debate amongst several prominent risk scholars. Tulloch (2008, 2009) for instance, refers to Beck as a critical realist, whilst Lupton (2013b) and Strydom (2002) classify his theory as weakly constructivist. Beck's writing reflects his own ambivalence in this regard. On the one hand he commends the ability of science to identify and quantify phenomenon such as the hole in the ozone layer and the appearance of acid rain (Beck, 1999). IA practitioners would be likely to agree with Beck's argument here, that unless risks are granted some degree of substance, or traced toward some form of physical manifestation, they would be

"nothing at all" (Beck, 2006:332). On the other hand, Beck is also cognisant of risks occupying an "intermediate space between security and destruction" whereby they are a "kind of virtual, yet real, reality" (Beck, 1998: 11). In his later publications, Beck describes how risks are trapped in a process of "becoming real" (Beck, 2006:332): once manifest they have already moved elsewhere "to the anticipation of further attacks, inflation, new markets, wars or the reduction of civil liberties" (Beck, 2006:332).

In sum, Beck's theory was first published when the time was right, firstly for scientists to become aware of the limitations of realist risk definitions and, secondly, for public stakeholders to have a coherent account in support of their suspicions and qualms about the rapid advance of science and sophisticated technologies. Irrespective of its precise location on the risk continuum, the enduring value of the risk society theory lies in its recognition of a relationship between technological risk and issues of social justice. In this respect, the overarching narrative account provided by the risk society offers both a general backdrop for the case study in Chapter 6, and some more specific points of reference, particularly when it comes to probing aspects of specialist practice in IA.

## The psychological phenomenon of risk

The psychological theory of risk is primarily aimed at explaining contrasting, and often divergent, perceptions of risk between experts and public stakeholders. This theory, and the associated psychometric paradigm that it forms the basis for, provide a lens for my second case study, namely, the EIA for a proposed nuclear power facility on the southern coastline of South Africa.

### Background to psychological theory

The development of a psychological theory of risk has been driven primarily by Paul Slovic (Slovic, 1986, 1999, 2000; Slovic et al., 2004, 2006, 2007). Although framing risk from the psychological perspective emerged in parallel with Beck's risk society theory, psychological researchers were motivated, not by the need to explain the condition of society, but rather to understand why individual perceptions of risk are often at odds with the 'hard' scientific data.

The earliest insights into how individuals form psychological judgements about risk dates to 1969, and the work of an American engineer and specialist in nuclear energy. In an article titled *Social benefit versus technological risk*, Chauncey Starr, presented research findings that point to an optimal level of perceived benefit below and above which social actors would find risk to be more, or less acceptable (Starr, 1969). His findings also indicated that the voluntary/involuntary distinction was an important factor determining people's attitudes to risk. These research outcomes highlighted an ostensible irony behind human agency in taking risks: "nobody wants to suffer, but everyone appears to want to be free to take risks, and to be his own judge of these risks" (Adams, 2001:52). Associated behavior has been exemplified in individual responses to government-imposed bans and restrictions during the COVID-19 pandemic, where some of rapid infection rates occurred in countries with the highest levels of enshrined 'freedoms' which citizens are reluctant to forego, even in the face of a deadly virus.

Following Starr's early contribution, psychological risk studies during the 1970s and 1980s focused primarily on the differences between voluntary and involuntary risk exposure, personal preferences, and the reasons for inconsistencies and discrepancies in what motivated people to accept or reject different types of risk (Fischhoff et al., 1978; Kahneman & Tversky, 2013; Lopes, 1983; Pollatsek & Tversky, 1970; Sandman, 1987; Tversky & Kahneman, 1974). A reason why this research was considered important, was its potential to assist experts pedagogically. In other words, it could help to develop effective methods for explaining to stakeholders how 'actual' risk differs from 'perceived' risk, and to encourage informed and sensible choices. In this regard, Slovic was inspired by the prominent geographer, Gilbert White, who was one of the first in this field to study public perceptions of risk (Greenberg & Lowrie, 2014). White challenged Slovic to uncover why people returned to disaster prone areas, affected by hurricanes, floods, or earthquakes, to rebuild and face the risk again (see Slovic et al., 1974). A desire to better understand the motivation behind people's choices in respect of risk was an important driver behind Slovic's development of a psychometric paradigm of risk perception. The key features of this paradigm are outlined below.

**Key tenets of the psychometric paradigm**

Building on early insights into the link between risk and control, a broad range of risk perception factors has been identified and articulated in the psychometric paradigm (Fischhoff et al., 1978; Slovic, 1986, 1987). In essence, the paradigm is premised on the idea that causes and consequences of risk are filtered through person-specific cognitive or mental processes. As explained by Slovic in an interview with Bob Heyman and Patrick Brown, the paradigm demonstrates that "just as you can attempt to assess risk from the quantitative technical side of things, you can also assess it on a social psychological or perceptual basis, producing orderly results that have implications for policy" (Heyman & Brown, 2013:499). The psychometric approach, therefore, provides a means by which risk perceptions can be systematically and logically studied according to a taxonomy of perception factors. These include voluntariness, controllability, familiarity, dread, trust, immediate, chronic, known to science, and so on. Hazards ranging from nuclear energy, through vaccinations, to riding a bike, have a unique pattern of qualities relating to perceived 'riskiness' (Slovic, 1987).

It is evident from the list of perception factors, that the key tenets of the psychometric paradigm are built on essentially normative preferences and desires: people wanting to feel safe, to have their anxieties affirmed, to be more in control, and so forth. Unlike the other two theories I discuss in this chapter, the base unit for the psychometric paradigm is the individual, and the associated modes of thinking that predispose him or her towards particular ways of evaluating risks. Accordingly, risk does not simply exist "out there" waiting to be assessed, but resides in a mental formulation that assists people to "understand and cope with the dangers and uncertainties of life" (Slovic & Weber, 2002:4). Scientifically derived information can, therefore, influence responses, but only so far as being one of a range of sources that come to bear on individual perceptions of risk (Covello & Sandman, 2001). According to (Jasanoff, 1993:127) risk becomes a "private calculation" by which information is translated into an "intimate scale of personal experience." In this respect, psychological theory is strongly linked to the strategy component of risk, described in Chapter 3 – "risk is seen as a concept that human beings have invented to help them" (Slovic & Weber, 2002:4).

The explanatory potential for the psychometric paradigm, has prompted an array of questionnaires and surveys including psycho-physical scaling and multivariate analysis, to devise "cognitive maps" of risk perception (Cairns et al., 2008; Covello et al., 2007; Fox-Glassman & Weber, 2016; Freudenburg & Pastor, 1992; Rohrmann, 2000; Sandman, 2001; Slovic, 2000; Taylor-Gooby & Zinn, 2006; Trumbo & McComas, 2003; Visschers & Siegrist, 2008; Weber, 2019; Wiedemann et al., 2013). Although much of this research confirms what is often an inverse correlation between characteristics of dangers/hazards and the manner of response, there are those who suggest that there is no real need for *evidence* of a disconnect between 'real' and 'perceived' risk. As noted by Blastland and Spiegelhalter (2014:7) there are so many commonplace examples, one can just as well "let the clash of perspectives stand on its own".

Arguably more useful is research that demonstrates the effects of the psychometric paradigm on participatory decision-making processes, and the role that the disconnect plays in generating and sustaining controversy (for example, Breakwell, 2000; de Groot et al., 2013; Gregory & Satterfield, 2002; Ho et al., 2019; Huxham & Sumner, 1999; Kunreuther et al., 2001; Löfstedt & Renn, 1997). Collectively these studies highlight the contribution of the psychometric paradigm towards facilitating risk communication, including among subscribers to the realist definition thereof. Organisations such as the Royal Society, the World Health Organisation and the Society of Risk Analysis, are among the professional bodies and institutions that have acknowledged the role that public perception plays in steering debates about technological and other types of developments. Since 1998 the Department of Environment in the United Kingdom has included "risk perception" as an input in its "risk assessment and management process flow" and many other institutions have done likewise (Aucamp, 2009:84).

The psychological paradigm has also formed a basis for the development of more refined and targeted models of risk communication, including the mental models approach (Morgan et al., 2002), the RISCOM model (Andersson et al., 1998; Andersson & Wene, 2006) and the social amplification of risk model (Kasperson et al., 2012; Pidgeon, 1999 – also referred to in Table 1). In conjunction with the

psychometric paradigm, these models facilitate the development of strategies for how dangers and associated precautions can be effectively communicated, particularly when it comes to safety information about medicines, foodstuffs, toxic chemicals, pesticides and so forth (see for example, Rother, 2011).

#### Relevance of the psychometric paradigm to IA

Arguably the most significant benefit of the psychometric paradigm lies in its ability to enhance understanding among EAPs, specialists and facilitators of stakeholder responses to risk issues in the context of public consultation processes for IAs. In addition to the perception factors that constitute the paradigm, a useful concept in this respect is what Slovic and colleagues (2007) have termed the "affect heuristic". Accordingly recollections, marked by positive and negative affective feelings, guide people's judgments about risk. More specifically, Slovic and colleagues (2007) propose that representations of objects and events in people's minds, are tagged to varying degrees with affect. In this process stakeholders refer to an ''affect pool'' containing all the positive and negative tags consciously or unconsciously associated with their recollections/representations (Slovic et al., 2007:1335).

Another research direction for psychological theory, that holds insights for stakeholder engagement in IA, is toward the role of emotion as an important consideration in risk perceptions (Earle, 2010; Finucane et al., 2000; Lupton, 2013a; Roeser, 2006, 2017; Siegrist et al., 2006; Siegrist & Sütterlin, 2014; Slovic et al., 2004, 2007; Trumbo & McComas, 2003; Tversky & Kahneman, 1974; Visschers & Siegrist, 2008). In Chapter 3, I made reference to emotion in the discussion of strategy as a diagnostic feature of risk, with the example of the firefighter. The importance of feelings in relation to risk is premised on the idea that individuals have a hard-wired or an innate ability to activate a kind of "early warning system" based on similarity and associations (Slovic & Weber, 2002:14). The importance of practical and intuitive judgement can be explained in relation to an evolutionary survival instinct, to a time when people used vision, taste, smell, and other feeling type sensations to judge risk, rather than relying on scientists and experts to dictate what is good and bad. Instinct is often intertwined with local knowledge, particular when stakeholders have lived an

area for a long time or have a particular connection with their surroundings. As Wynne (1992) describes with reference to the case of Cumbrian sheep farmers' responses to scientific advice about the restrictions introduced after the Chernobyl radioactive fallout, experiential wisdom is often accompanied by an innate ability to anticipate and understand environmental thresholds and the effect of change.

Awareness of the psychometric paradigm, heuristics and the role of emotion can assist EAPs, and others that facilitate public participation processes for IA, in shaping their communicative actions to minimise or avoid conflict. An awareness of features of risk that provoke dread, compared to those that foster comfort is, therefore, pertinent in planning around engagement about potentially controversial developments. Accordingly, experts can be coached in ways to show humility, listen attentively, acknowledge fears, ensure that information sources are credible, avoid disparaging comparisons that make stakeholders feel ignorant, and so forth (Covello & Sandman, 2001). Towards this end, Sandman's conversion of the risk formula to "Risk equals Hazard plus Outrage" is prevalent in risk communication strategies aimed at quelling negative sentiment or hostile responses to contentious issues, proposals or technologies (Sandman, 2012).

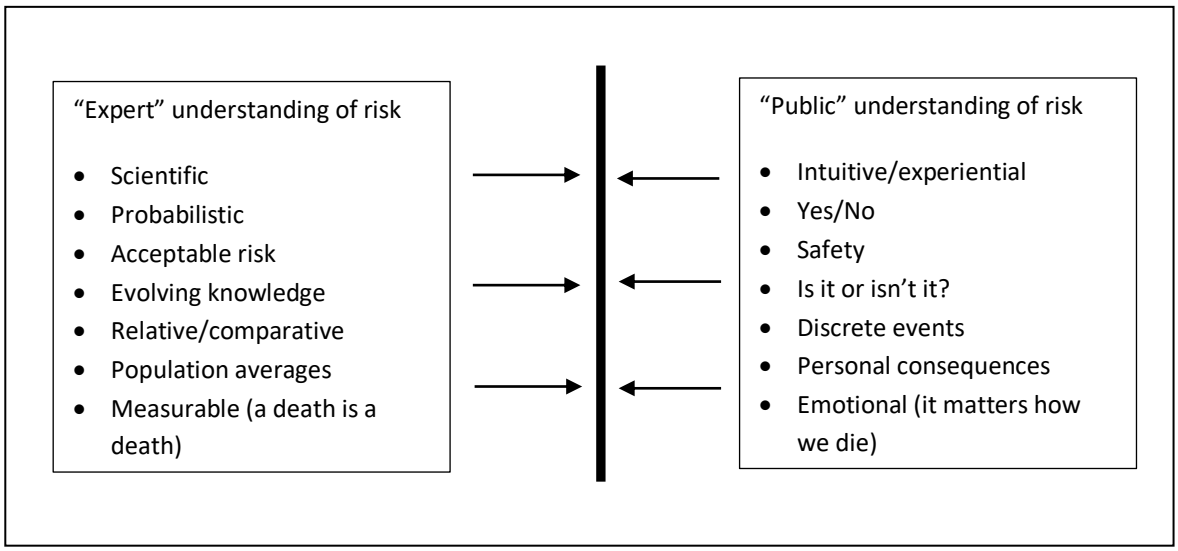
Notwithstanding the insights offered by the psychometric paradigm and benefits for risk communication, it's critics have highlighted several shortcomings, a number of which problematise reliance on associated strategies for public engagement in IA.

#### Critical appraisal of the psychometric paradigm

One of Slovic's aims for the psychometric paradigm is to enable the production of orderly accounts of risk perception that have implications for policy, on a par with scientific assessments (Slovic et al., 2018). Inherent in this aim, and evident in much of the literature and research based on the psychometric paradigm, is the number of binaries in the theory (Boholm, 2008). Prominent distinctions include that between experts and lay people, between those affected by decision and those who make the decisions, between conflict and co-operation, between facts and values, and between inclusion and exclusion in decision processes. These add up to the assumption of a

profound divide across which trustworthy partnerships need to be built. The diagram below (Figure 3) is indicative of this perceptual rift.

Figure 3: Expert/lay divide (adapted from Powell & Leiss, 1997:27)




Of concern for critics of psychological theory is the manner in which non-expert opinion is framed by those on the 'right' side of the divide. Consequently, even though scientific knowledge is treated as one of many contributions to the public debate it still holds to be "the final arbiter of truth" (Jørgensen & Phillips, 2002:181).

Douglas (1985), for instance, maintains that the psychometric paradigm is founded on a fundamental bias toward the type of rational behaviour "driven to seek order in the world" (Douglas, 1985:28). Accordingly, social actors are cast as "information-processing units" who take in data and deal with it in circumscribed and limited ways. Consequently, for Douglas, psychological theory promotes a form of "perceptual pathology", instead of being an inclusive social, cultural and ethical theory of human judgement (Douglas, 1985:3). Other scholars also have reservations about the psychometric paradigm's tendency to differentiate between non-scientific or inexpert knowledge on one hand, but then to also frame lay perceptions as distorted. Jasanoff's opinion is that this has led to risk perception being treated as "a topic in the sociology of error" (Jasanoff, 1998:92).

Lupton (2013b) focuses her critique on the individualistic level of the psychometric approaches. She highlights the psychometric paradigm's limitations in respect of symbolic risk meanings created via the social world: "People tend to be positioned outside the cultural and political frameworks, relationships and institutions within which they construct their beliefs and engage in behaviours" (Lupton, 2013b:32). Individuals are, consequently, represented as atomized and self-interested, constrained by their ignorance or lack of self-reflection (Lupton, 2013b).

These reservations about psychological theory suggest that applying the insights offered by the psychometric paradigm in the IA context is not as straightforward as it may seem. An obvious potential pitfall is the temptation to use communication techniques persuasively rather than consultatively. Hayenhjelm (2007) suggests that the intention to reassure stakeholders that their perceptions are inversely proportional to the 'real' dangers, or to convince them to view risk from the experts' perspective, means that facilitative communication activities can become exercises in public relations. Glucker and colleagues (2013:106) agree that forms of "instrumental rationale" for public engagement will fall short when it comes to enhancing the democratic capacity of stakeholders.

Relevant to South Africa, is the low to middle income context for IA, where communicating persuasively often goes hand in hand with assumptions about community members and their ability to process information about risks. Highlighted by Hayenhjelm (2006) is that vulnerable communities are more likely to invest in the hope that an option is believed to offer, which can be driven by an imperative to escape from some or other difficult or unbearable situation. Stakeholders in such situations are particularly susceptible to persuasive techniques. In this regard Fischhoff (2012:211) cautions against experts "seeking the rights of science without assuming its full responsibility".

Among drawbacks highlighted by scholars, arguably the most significant limitation of psychological theory is a failure to include organisational systems as a constraining factor in individual decisions about risk in the same way as sociological theory (Chess, 2001). Such systems are especially relevant in relation to Fairclough's explanatory

dimension of discourse, as will be apparent in the case study of the nuclear power station.

### Locating psychological theory on the risk continuum

Before concluding this description of the psychometric paradigm, it remains to briefly consider the position of the theory on the risk continuum. In this respect, the idea of risk as a mental construct would suggest that the psychological theory is situated towards the constructivist end of the spectrum. However, as Jasanoff (1998:91) points out, efforts to study risk perception systematically and with methodological rigour, is in effect "to make a *science* of it". Horlick-Jones (1998:82) argues that it is the potential for perceived risks to influence organizational and public agendas that make them "every bit as real as scientific assessments, even if they are more obviously judgmental". As indicated in Figure 2, the psychometric paradigm is thus, relative to other theories covered in this Chapter, skewed more toward the realist end of the continuum. Renn (2008) provides the following explanation:

> *Perceptions have a reality of their own: just like the characters in animated films who, suspended in mid-air, do not plunge to the ground until they realize their predicament, people construct their own reality and evaluate risk according to their subjective perceptions* (Renn, 2008:111).

Corresponding to Renn's depiction, Slovic and colleagues' premise for the psychological theory is vested in a lay interpretation of risk as hazard via "heuristic" reasoning (Slovic et al., 2007:1333). The word "perception" links the construct of risk to a familiar mental picture. Risk responses are, consequently, thought to be based on a 'real' visual representation of consequences which infiltrate the 'mind's eye' via various channels, many of which have been '*media*ted', in the most literal sense. In the previously mentioned interview with Heyman and Brown (2013) Slovic's offers his personal definition of risk, as follows:

> *I am most comfortable with defining risk as a blend of the probability and severity of some hazardous outcome. Because the evaluation of an outcome is fairly subjective, risk is also a subjective concept* (Heyman & Brown, 2013:500).

In sum, the psychometric paradigm's contribution to understanding risk is influential in many situations and for a range of disciplines, provided these can benefit from the asymmetries within the theory. Undoubtedly, risk communication strategies work well in situations aimed at either assuring or warning audiences. In these circumstances target groups share common characteristics and concerns – farm workers using pesticides, consumers purchasing a particular product, even an entire population that need to be persuaded to be vaccinated for the common good. The value of psychological theory lies in its highlighting how attitudes towards risk are, in general terms, linked to a sense of power and control, or lack thereof. However, the theory can also lure experts and facilitators into treating stakeholders like target audiences or as the atomized 'information processing units' that critics of the psychometric paradigm refer to. Some of the consequences of this tendency will be illustrated in the case study for the proposed nuclear power station in Chapter 7.

## The cultural phenomenon of risk

The previous two theories have framed risk, firstly as a signifier of contemporary society and, secondly, as an individual mental formulation. Cultural theory adds a third dimension to a multifaceted depiction of risk, stemming from the discipline of anthropology. The lens of this theory is applied to my third case study in Chapter 8, focusing on the controversy around shale gas hydrofracking in the Karoo and the resultant SEA.

### Background to cultural theory

Cultural theory is chiefly credited to the anthropologist, Mary Douglas (1921-2007), although the grid-group typology associated with the theory, and other details, have been refined in her collaboration with Aaron Wildavsky (Douglas & Wildavsky, 1982), and later by Thompson and colleagues (1990). These authors have ascribed cultural theory's key tenets to the results of decades-long ethnographic studies and observation (Douglas & Wildavsky, 1982). The results of this research provide a strong philosophical and empirical basis to what Douglas (1999:411) refers to as a "parsimonious model" of risk, called the grid-group typology.

According to cultural theory, social actors are pre-disposed to having a particular attitude or opinion about risk, linked to social relations and cultural practices. In developing this hypothesis, Douglas spent many years studying diverse social structures and survival strategies, ranging across temporal and geographic settings. This research supports her belief that communities, throughout history, have developed practices and tools to cope with uncertainty and to explain misfortunes. These approaches are not only about spiritual beliefs, they are also about non-theistic rituals and cultural patterns of existence. These traditional customs, rituals and patterns are linked in cultural theory to contemporary political and moral strategies for the management of risk (Rayner, 1992; Tansey & O'Riordan, 1999).

An example of traditional custom, described by Alaszewski (2015) is Malinowski's study of the Trobrian Islanders of the Western Pacific (Malinowski, 2013). Reminiscent of the etymological roots of risk presented in Chapter 3, this seafaring community's occupation in maritime trade involved dangerous sea voyages in an inter-island network of exchange – the Kula Ring. Whilst living among the islanders, Malinowski observed their reliance on a combination of technology and magic to cope with uncertainties. Boat building in preparations for their voyages comprised two stages. The initial design and building stage involved the boat owner and immediate family. In the second stage, the broader community participated in ritualistic blessing ceremonies. According to Malinowski, the technical / organisational part of readiness was based on a form of instrumental rationality, which was then complemented by an act of faith in the second stage. Both stages work together to ensure, from the community's perspective, that the journey is safe and successful.

> *Magic puts order and sequence into the various activities…it and its associated ceremonial are instrumental in ensuring the co-operation of the community, the organisation of community work…far from being a useless appendage, or even a burden on the work, (magic) supplies the psychological influence, which keeps the people confident about the success of their labour and provides them with a natural leader (the magician)* (Malinowski, 2013: 116).

Such studies, combined with her own ethnographic fieldwork in the former Belgian-Congo and other 'pre-modern' cultures in Africa, supports Douglas's proposition that uncertainty is a central dimension around which behaviors are organised. In another example, in Uganda, the Hima sought reasons for why their cattle became ill, believing that contact between women and cattle may be the cause (Douglas & Wildavsky, 1982). Women were thus barred from interaction with the animals. This demonstrate how the allocation of responsibility becomes a "strategy for protecting a particular set of values belonging to a particular way of life…shared confidence and shared fears, are part of the dialogue on how best to organise social relations" (Douglas & Wildavksy, 1982:8).

Compared to the psychometric paradigm, cultural theory like the risk society theory, is a 'grander' narrative but does not share risk society's depiction of 'new' risks evolving from technological development and aspects of globalisation. Nor does the theory regard judgements about risk as being driven by individual sensibilities and choices. According to Douglas (1992:58):

> *…individuals do not try to make independent choices, especially about big political issues. When faced with estimating probability and credibility, they come already primed with culturally learned assumptions and weightings.*

It is such "assumptions and weightings" that focuses people's attention on issues to do with fairness, the distribution of power and allocation of blame.

#### Key tenets of cultural theory

The mainstay of cultural theory is that rites and taboos in different cultural settings have constraining and empowering effect on social norms in respect of risk and the management of uncertainty. This observation forms the basis of two key concepts that underpin the theory and its associated "grid-group typology": cultural bias and social relations. Cultural bias is defined as shared values and beliefs; and social relations are defined as patterns of interpersonal relations (Douglas, 1999). These reinforce each other to produce specific "ways of life" based on mutually supported conventions and expectations (Thompson et al., 1990). Supporting this categorisation

of shared worldviews are several postulates in cultural theory which have to do with the symbolic aspects of judgements about danger, pollution and 'Otherness' (Lupton, 2013b). Douglas discusses these concepts in her books *Risk Acceptability according to the Social Sciences* (Douglas, 1985) and *Purity and Danger* (Douglas, 2002).

*Pollution as matter out of place*

As part of connecting understandings of risk to rituals and social patterns of organisation, Douglas was interested in the idea of pollution and what pollution means in different settings. She uses the phrase "matter out of place" to suggest that the "anti-ness" or "defilement" of matter, is provoked as much by its appropriateness as by its intrinsic properties (Douglas, 2002:36). For example, dirt is perfectly acceptable and useful in an agricultural field, but taboo in the household, needing to be bought under control by ritualistic spring-cleaning and "other domiciliary standards of hygiene" (Douglas, 1970:1). This provocation of discomfort is extended to animals which, in some cultural traditions, are "unclassifiable" according to conventional features or characteristics. Such ambiguities become the basis for ritualistic ceremonies or dietary rules signifying membership of a particular grouping or community.

Stemming from this interpretation of pollution, risk is tethered to the idea of things being 'out of place' - harmful in one context, and benign in another. What may be an innocuous parasite in a forest becomes a deadly virus in towns and cities, plants in one setting are aliens in another, radiation is useful in nuclear fission, but deadly if it escapes the confines of the reactor. Even people go from being citizens, to outcasts or refugees, if unwelcome beyond the borders of their country or community. The idea of 'otherness' is, therefore, an important premise for worldviews and associated responses to risk.

*Guarding boundaries*

A second premise for cultural theory, also linked to the notion of 'otherness', is to do with boundaries and the crossing thereof. Douglas's ideas in this regard stem from her conception of the human body as a microcosm of the broader 'body politic' (the

community of which it is a part) (Lupton, 2013b). Characteristic of both the human body and the 'body politic', is an 'inside' and 'outside', separate and policed via distinct openings. Notions of what goes in and out of the body - what is dangerous or pure - reflects boundaries in society, how they are maintained and regulated according to what/who belongs and what/who doesn't. Boundaries are inevitably precarious, being most vulnerable to infiltration. Patrolling boundaries is a particular concern for human societies, in terms of dealing with threats to order and stability posed by contamination, disorder and pollution (Lupton, 2013b).

Douglas's ideas about boundaries resonates in respect of many contemporary issues and controversies, including Brexit, the refugee crises, illegal trade in plant and animal species. The importance of policing access and egress has been exemplified in relation to the COVID-19 pandemic. The body needs to be protected using masks and shields, and the 'body politic' must be defended by social distancing, 'bubbles', lockdowns, COVID passports and so forth.

> *All margins are dangerous. If they are pulled this way or that, the shape of fundamental experience is altered. Any structure of ideas is vulnerable at its margins. We should expect the orifices of the body to symbolise its specifically vulnerable points. Matter issuing from them is marginal stuff of the most obvious kind. Spittle, blood, milk, urine, faeces or tears by simply issuing forth have traversed the boundary of the body…The mistake is to treat bodily margins in isolation from all other margins* (Douglas, 2002:122).

Otherness and boundaries are essential components of Douglas's cultural framework for understanding how groups in society regard danger, and build trust or distrust in other social actors and in institutions (Tansey & O'Riordan, 1999). The essence of the theory is that risk interpretations are linked to ethical codes which, in turn, support a moral system. This idea is related to a final important tenet of Douglas's theory, and that is the connection between risk and blame.

*The forensic character of risk*

As signified in the discussion of corpus linguistics studies in Chapter 3, risk and its association with "blame" and "victim", confirms a moral and political dimension to

risk in which responsibility is implicated. As a proponent of cultural theory, Lupton (2013b:63) notes that "in contemporary western cultures, every death, every accident and every misfortune is 'chargeable to someone's account'". Consequently, to be "at risk" is the equivalent to being sinned against (Douglas, 1985). According to this 'forensic' scheme, disasters that pollute the air, the soil or water, demand culpability, or as Douglas suggests "someone already unpopular is going to be blamed for it" (Douglas, 1992:5).

Douglas stresses that the forensic quality is an attribute that has evolved with the transition of risk from formula to phenomenon. She proposes that the original idea of risk was neutral – "it took account of the probability of losses and gains" (Douglas, 1990:2). The "fulcrum of change" has come with demands for accountability (Douglas, 1990:3). The resultant dialogue "carried out incessantly in any community", she argues, is essentially "a contest to muster support for one kind of action rather than another" (Douglas, 1990:3).

There are many contemporary examples linking risk to blame, a recent case being the resignation of the Lebanese government in response to social fury and outrage after the ammonium nitrate explosion in Beirut in August of 2020. Drawing again on the example of the COVID-19 pandemic, discourse about the illness, tend to vacillate between compassion and blame. Ambivalent sentiments, sorrow and retribution, are also reflected in the broader political and response to the pandemic, the latter particularly in demands from the US that China account for the source of the virus.

Scaling down the forensic component of cultural theory to IA, the absence of clear follow-up mechanisms and ways of holding developers to account is a common criticism of the practice (Cele, 2016; Hulett & Diab, 2002; Morrison-Saunders & Arts, 2004). This weakness is connected to issues of trust in expert forecasts. If there can be no guarantee that things will not go wrong – who does the checking and which "other" takes responsibility if or when they do?

**Relevance of cultural theory to IA**

Douglas's ideas about otherness, boundaries and blame have all been incorporated in a grid-group typology that is widely relevant to IA. This typology that is connected to cultural theory in a similar way that the psychometric paradigm is linked to psychological theory.

The grid-group typology, which encapsulates the essence of cultural theory, allocates stakeholders to distinct categories – described variably as worldviews, cosmologies or solidarities. The categories are determined by how people view the world according to two dimensions of sociality: group (who am I?) and grid (how should I behave?). The model, depicted in Figure 4, comprises a vertical axis (grid) and horizontal axis (group). The grid dimension is indicative of the degree to which externally imposed rules are accepted as prescriptive or constraining – "the more binding and extensive the scope of the prescriptions, the less of life that is open to individual negotiation" (Thompson et al., 1990:5). The group dimension refers to the extent to which people are incorporated into bounded units, defined according to the claims made over constituent members, the boundary drawn around them and the levies and constraints applied (Douglas, 1982b).

There are a minimum of four and maximum of five "solidarities" formed by the interaction between grid and group: Fatalism, Individualism, Hierarchy and Egalitarian. The fifth cosmology, called Autonomy, did not feature in Douglas's original theory but was later added by Thompson and colleagues (1990), and sits in the middle of the diagram, unaffiliated to any other solidarity. Each way of life is linked to a set of attributes that govern perceptions of and responses to risk (see Table 2).

Figure 4: Grid-group typology (Douglas, 1982b modified by Thompson et al, 1990)

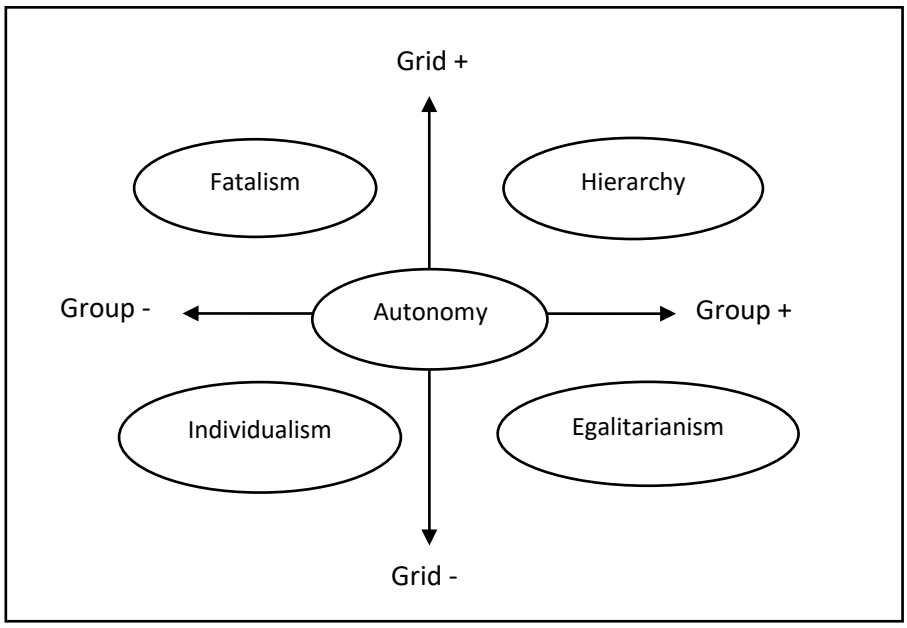



Table 2: Explanation of the grid-group typology

| | Centre | | Border | | |
|---|---|---|---|---|---|
| **Features:** | **Hierachical** | **Individualist** | **Egalitarian** | **Fatalist** | **Autonomy** |
| **Preference and outlook:** | Control, regulation, harmony;<br><br>Routinised symbolic action and group orientated goals;<br><br>Favours economic growth in a normalised context. | Independence, self-determination, and entrepreneurship.<br><br>Competition, versatility, adaptability;<br><br>Views economic growth as greater benefits for all. | Pressure for equality;<br><br>Rejection of stratification and regimentation;<br><br>Collective decision-making;<br><br>Skeptical of economic growth and potential for inequitable spread of benefits. | Limited participation in social life;<br><br>Tied to decisions and actions of social groups they do not belong to;<br><br>Disassociated from benefits of economic growth. | Disciplined and aloof from social involvement;<br><br>Self-sufficient;<br><br>Withdrawn from transactional activities and economic pursuits. |

| Features: | Hierachical | Individualist | Egalitarian | Fatalist | Autonomy |
|---|---|---|---|---|---|
| **View of nature:** | Tolerant/ perverse:<br>  <br>Unpredictable risk of exceeding limits justifies regulation;<br><br>Nature should be protected by society. | Benign/robust:<br>  <br>Nature and society separate;<br><br>Technology capable of overcoming natural perturbations;<br><br>Natural resources offer opportunities for progress. | Ephemeral/ vulnerable:<br>  <br>Humankind trapped in downward spiral of resource depletion;<br><br>Society part of nature but nature remains grand comptroller. | Unpredictable/ capricious/coincidental;<br>  <br>Lack agency to make a difference. | Freely available, changeable/ fruitful/ resilient;<br><br>Not the function of humankind to manage or exploit resources. |
| **Source of trust:** | Evidence;<br><br>Scientific knowledge. | Quantification and fairness;<br><br>Market liberalism. | Human goodness;<br><br>Like minded members – the sister /brotherhood. | Themselves. | No particular person or entity. |
| **Attitude to risk:** | Acceptable provided decisions made by experts – cautious;<br><br>Individual sacrifice required for collective gain. | Utilitarian approach;<br><br>Prone to taking chances;<br><br>Risks are opportunities. | Alert to long-term possibilities;<br><br>Invocation of danger linked to sins of the bureaucracy and capitalist controlled markets;<br><br>Attention to details that others may miss. | Indiffferent;<br><br>Dangers are unavoidable. | Acceptance of risk and the tolerability thereof. |
| **Allocation of blame:** | Non-conformists; deviants. | Lack of skill /incompetence; impositions to individual freedom (e.g., taxes). | The (capitalist) system or establishment. | Fate or providence. | Variable: where justified. |

At the top of the table, two overarching distinctions are indicated, between the "Centre" (Hierarchy and Individualists) and "Border" (Fatalists and Egalitarians). A feature marking this distinction is what Douglas and Wildavsky refer to as "complacent" attitudes of the Centre, compared to "alarmist" behavior at the Border (Douglas & Wildavsky, 1982:83, 102). A contention of the theory is that adherents to these different rationalities compete with one another in discursive struggles, to impose their views on the other solidarities (Thompson, et al., 1990).

In line with the grid-group typology, actors in IA including developers (exhibiting individualistic preferences) and government institutions (exhibiting hierarchical preferences) are classified as Centre (Douglas & Wildavsky, 1982). Although the IA profession is deemed to be independent, its default position is also Centre-aligned: privately or government appointed EAPs must abide by administrative procedures, or those defined in law, and their activities must conform to the rules of their affiliates, professional bodies and the terms of reference provided by their clients. In terms of the features identified in Table 2, the "nature-as-tolerant-within-limits" perspective is relatively suited to IA and the role of science and expert opinion in deciding what the limits are.

Border affiliates, according to the typology, are typified by environmental objectors. Douglas and Wildavsky (1982) suggest that a sense of border is inherent in people who are not committed to and, therefore, critical of "some defined *other* part of human society where power resides" (emphasis added). Border organisations thus tend to be defined by what they are not in relation to the Centre, i.e., non-government or non-profit (NGOs and NPOs). Such organisations distinguish themselves by disassociation from traditional centres of power and influence.

Despite what some might perceive as a "fluidness and quasi-membership" associated with NGOs and protest movements (see Lash, 2000:47), in Douglas's more dogmatic view there is a firm boundary around egalitarian alliances maintained by their subscription to symbols, and identification of a common adversary. According to the prescripts of the typology, disvaluing of the 'other' is an important strategy for the egalitarian worldview to affirm solidarity. Unlike the more tractable characteristics of

the fatalist category, egalitarian perspectives of risk will be less amenable to being influenced by expert members of the hierarchy.

Important in relation to the realist definition of risk favoured in IA, is that Centre-aligned rationalities tend to treat the future as an extension of the present, in the belief that statistical data and lessons learned, can be an effective means of anticipating and governing possible outcomes. Conversely, the Border aligned worldviews tends to expect discontinuity, or calamity, based on a view of the Centre as untrustworthy, and a perspective of nature as vulnerable to exploitation. An extreme Egalitarian position would consequently underscore the need for communities to reject modern technologies and "return to their essentially human power or moral regeneration" (Douglas & Wildavsky, 1982:123). Less extreme egalitarian worldviews are exhibited by groups that tend to be more hierarchically organised, and prone to defend "specific bits of nature", rather than try and "convert all of humanity" (Douglas & Wildavsky, 1982). With respect to the environmental movement, the egalitarian categorisation can apply to targeted campaigners focused on single causes (objects of value), such as the World Wildlife Fund, or more all-encompassing groupings, such as Greenpeace.

Although cultural theory has not previously been applied specifically to IA, Douglas's ideas have been explored in relation to several environmental issues, including water and common property resources (Buck, 1988; Day & Patel, 2021; Hoekstra, 2000; Offermans, 2010; van Asselt et al., 2001), climate change (Janssen & de Vries, 1998; O'Riordan & Jordan, 2007; Pendergraft, 1998; Verweij et al., 2006) and GMOs (Finucane & Holup, 2005). These studies rely on cultural theory to provide insight into how stakeholders are positioned in respect of risk concerns by virtue of their cultural networks and associations (see also Dake & Wildavsky, 1991).

In the case study of the hydrofracking for shale gas in Chapter 8 of this thesis, it is clear how cultural theory's "modes of organisation" in relation to risk (Thompson et al., 1990), effectively steer the course of the debate.

**Critical appraisal of cultural theory**

Cultural theory has been touted, alongside the risk society, as "responsible for establishing the prominence of the concept of risk within the lexicon of contemporary social theory" (Wilkinson, 2001:1). Notwithstanding this distinction, Douglas and Wildavsky's presentation of the grid-group typology has elicited support and disapproval. Åsa Boholm is among the earlier critics of the typology, pointing out that a limited number of stereotypes will inevitably run into difficulties "should it attempt to account for complex social reality that is inhabited, not by artificial constructs, but by real people" (Boholm, 1996:73). In defence of Douglas's contribution, Lupton stresses the model's representation of ideal types provides an invaluable "basis for examining the cultural locations within which risk is conceptualised and dealt with in a particular sociocultural setting" (Lupton, 1999:51-52). In respect of Lupton's opinion, Douglas was explicit about the categories in the typology as representing extreme cases - "stable organisational forms", with the "remaining possible mixtures assumed by the theory to be transitional" (Douglas, 1999:411). She also stressed that the model should be limited to just four categories, in order to be clear and demonstrative (Douglas, 1999).

Despite Douglas's justification of the simplicity of the model, a concern shared by most critics is the presumption that cultural adherences are fixed in time or space. Cultural theory's detractors point out that adherence to one rationality readily gives way to another at a later moment or under different circumstances (Boholm, 1996; Elliot, 1983; Oltedal et al., 2004; Sjöberg, 2002). For example, hierarchical bias in the workplace may revert to more egalitarian or fatalist behaviours in the home environment – an incongruity that many EAPs and environmental administrators are likely to relate to.

In response to this difficulty, Thompson and colleagues (1990) introduced additional ideas to the typology in order make it more dynamic. They proposed that because people may be both attracted to and repelled by rival ways of life, coalitions are continually fusing, breaking apart and reforming. In this respect, they suggest that adherents to alternate ways if life are susceptible to being "surprised" in different ways

(Thompson et al., 1990:69). Hierarchists, for example, will be surprised if others do better on the basis of less evidence, less control or less knowledge. Egalitarian groupings would be surprised by lack of self-interest or if a development results in equal benefits for all. Individualists would be surprised if the market failed or if they personally did not overcome odds and fare well. In circumstances where a whole series of surprises mitigate against the expectations inherent in a particular worldview, adherents will consider an alternative that provides a more satisfying fit with their experiences.

Another remedy devised by Thompson and colleagues to address the static character of the typology, is the idea of "regimes" (Thompson et al., 1990:4). They propose a regime as the outcome of the discovery, by two solidarities, of sufficient common ground to focus on the same goal. Regimes do not entail the abandonment of one worldview for another, but rather a temporary alliance in which the ends justify the means, and in the long run, serve to maintain the cultural bias of either solidarity. The establishment of regimes generally requires a degree of compromise in terms of cultural bias.

Despite its dynamic reformulation by Thompson and colleagues, Boholm (1996) remains adamant that the grid-group typology has inherent flaws. She is among several critics who point out that the suggestion that boundaries may be voluntary crossed, or temporarily dissolved, is inconsistent with the basic premise of cultural theory to differentiate one solidarity from another. This concern is linked to another significant problem with the typology, relating to a lack of verified and empirical findings to support the theory. Studies aimed at proving the grid group typology and associated cultural biases, using standardised survey and questionnaire approaches, have produced qualified and unconvincing outcomes (Dake, 1991; Marris et al., 1998; Rippl, 2002; Sjöberg, 1997). According to Tansey and O'Riordan (1999) this is partly because the typology is meant to be a relative rather than an absolute analytical tool. In other words, it is not intended to define explicit individual rationalities, but rather to explain how people's actions, responses and behaviours are embedded in social contexts. Boholm (1996), on the other hand, attributes the lack of veracity to a more fundament tautology. She stresses the circularity of evidence in trying to prove a

hypothesis when the conclusions are already contained in the premises – the predicted behavior of individuals in any one sector of the typology is semantically incorporated in the characteristics of that category:

> *There is a vast difference between research that strives to disclose cultural categories as those defined by the culture in which they exist – which is what social anthropologists normally do – and research that imposes preconceived and arbitrary constructs* (Boholm, 1996:73).

Notwithstanding critique of the typology, a normative principle, stressed by Thompson and colleagues (1990), is important: the idea that all five interacting solidarities ought to be recognised. Although one may dominate, other cultural biases should not be excluded from risk debates. In other words, the ideas of a hegemonic set of beliefs (or worldviews) should compete with, but not eclipse one another. This is a sentiment also expressed by Ulrich Beck (2006). The author of the risk society theory, which I have discussed in the first part of this chapter, refers to "taken-for-granted" frames of reference which, he claims, "prevents sociology from understanding and analysing the dynamics and conflicts, ambivalences and ironies of world risk society" (Beck, 2006:344). He goes on to refer to the two major theoretical approaches and empirical schools of research, which deal with risk, in the tradition of Mary Douglas on one hand, Michel Foucault on the other.

Further testimony to the longevity and influence of cultural theory is the more recent extrapolation of a cultural cognition theory. Championed by Professor Kahan of the Yale Law School cultural cognition is, in essence, a fusion of cultural theory with the psychometric paradigm (Kahan, 2008, 2010, 2015, 2017; Kahan et al., 2011). According to Kahan and colleagues, this allows each theory to answer questions posed by but not satisfactorily addressed by the other (Kahan et al., 2011). Cultural cognition theory retains the importance of worldviews but then seeks to incorporate an emphasis on social psychological mechanisms that connect individuals' risk perceptions to their cultural outlooks. The result of this synthesis is what Kahan describes as a specific form of motivated reasoning, namely, "identity-protective cognition" (Kahan, 2017:1).

This latest iteration of cultural theory is not without its critics. An example is van der Linden (2016) who suggests that cultural cognition theory is little more than "a thesis that aims to explain why specific American groups with opposing political views disagree over a select number of contemporary science issues" (van der Linden, 2016:128). The critique also suggests the Kahan's cognitive approach overgeneralises specific findings from social psychology, and underappreciates the pluralist character of the "general public" (van der Linden, 2016:128).

Notwithstanding various iterations and criticism of cultural theory, Douglas and Wildavsky's research has, undoubtedly, raised key questions and produced valuable insights as far as understanding definitions of risk and risk policies is concerned: "work which no one can dispense with and which will always remain an essential component of social science risk research" (Beck, 2006:344). Beck sums up their combined achievement as "to open up risk as a battle for the redefinition of state and scientific power" (Beck, 2006:344).

#### Locating cultural theory on the risk continuum

Of the three theories presented in this chapter, cultural theory sits furthest along the continuum toward the constructivist end of the spectrum, primarily owing to its concern with power and symbolism. In an essay in recognition of her fellow scholar, Aaron Wildavsky, Douglas writes as follows:

> *All knowledge and everything we talk about is collectively constructed. Language is no private invention. Words are a collective product, and so are meanings. There could not be risks, illnesses, dangers, or any reality, knowledge of which is not constructed* (Douglas, 1997:123).

Here Douglas re-iterates how the 'reality' of risks are morally defined, and also politicised. Accordingly, risk implies a process by which dangers are selected for attention by society, for reasons that make sense to a particular cultural grouping, based on shared concerns and values. By emphasising the role of risk in defining what is socially acceptable and what is not, cultural theory is inherently contrary to a view that risk judgments by experts should be seen as more objective or accurate over those

of other social actors. In this regard Douglas and Wildavsky (1982) argue the following:

> *(S)pecialised risk analysis impoverishes the statement of a human problem by taking it out of context. The notion of risk is an extraordinarily constructed idea, essentially decontextualized and desocialised…(w)hat is known is so small compared to what is not known that gaps are filled by guesses by experts and individuals. These guesses depend largely on the moral education of the person who is guessing. Everyone is biased – what is valued is as important as what is known. Science and risk assessment cannot tell us what we need to know about threats and danger since they explicitly try to exclude moral ideas about the good life. Where responsibility starts, they stop (*Douglas & Wildavsky, 1982:73-74).

As will illustrated by the case study, the insights provided by cultural theory contribute to an appreciation for why certain stakeholders hold particularly firm views which are not open to negotiation. This is not to say that stakeholder groupings will always have their minds set about a proposal from the beginning, rather that they bring to the process opinions borne out of, and maintained by, patterns of relations that dispose them to interpret risk in a way that supports their cultural bias. In highlighting this inevitability, cultural theory prompts consideration of what stakeholders deem to be worthy of defending, maintaining, or bringing into existence (Tulloch & Lupton, 2003). Connecting cultural theory to discourse, Renn identifies how the "fabric and texture of these constructions reflect both the interests/values of each group or institution…and the shared meanings of terms, cultural artifacts, and natural phenomena among groups" (Renn, 2008:37). Consequently, there will be a connection between worldviews, the object of value that forms a diagnostic feature of risk, and associated strategic intentions on the part of implicated stakeholders.

## Comparing and consolidation the theoretical perspectives

It is clear from the descriptions of each theory that these offer distinct forms of knowledge which converge in constructions of risk at variance with the customary scientific formulas. Although an element of cohesion is introduced by the occurrence of these theories on the risk continuum, it is still important that they do not simply

amount to an eclectic mix. In the table below the main features of each approach are compared thereby clarifying the complementary kind of knowledge each supplies to a multiperspectival theoretical framework of social practice. Each theory offers insight into the wider meaning of risk and, to some extent, compete with one another as well as the realist perspective. That said, there are also large areas of overlap between the theories, and the work of each theorists contains references to each other's contributions to the risk debate.

Table 3: Comparing realist and alternative theories of risk (adapted from Day et al., 2019)

| **Discipline:**<br>**Attributes:** | **Science and engineering: calculative probabilistic** | **Social: risk society & reflexive modernity** | **Psychological: psychometric paradigm** | **Anthropology: cultural theory & grid-group typology** |
|---|---|---|---|---|
| **Whose perspective?** | Physical scientists and engineers. | Society in general. | Individual stakeholders. | Groups & affiliations (e.g. NGOs). |
| **What is the underlying epistemology?** | Realist/rational. | Ambiguous. | Weakly constructivist. | Constructivist. |
| **What is the focus of study/subject of analysis?** | Risk itself. | Societal response to risk. | Individual perception of risk. | Social organisation and group responses to risk. |
| **Is the approach theory/method/ concept?** | Method. | Explanatory theory / grand narrative. | Part theory, part method. | Explanatory theory. |
| **What is the definitional emphasis?** | Risk as uncertainty. | Risk as values. | Risk as perception. | Risk as values and belief. |
| **How is risk viewed?** | Measurable and one-dimensional. | Immeasurable and multi-dimensional. | Partly measurable and multi-dimensional. | Immeasurable and multi-dimensional. |
| **How can this approach be useful for EA?** | Predicting outcomes in stable contexts;<br>Characterising uncertainties;<br>Detecting deficiencies in technical systems; Improving safety. | Explaining social anxiety;<br>Exposing limits of accepted EA tools;<br>Prompts recognition of changing nature of risks – globalisation of doubt. | Understanding individual risk responses;<br>Allaying fears;<br>Communicating risks;<br>Correcting misperceptions;<br>Insight into common heuristics. | Understanding how & why groups mobilise in response to risk;<br>Encourages self-reflection;<br>Recognising & explaining bias;<br>Adaptable to different cultural settings. |

| Discipline:<br>Attributes: | Science and engineering: calculative probabilistic | Social: risk society & reflexive modernity | Psychological: psychometric paradigm | Anthropology: cultural theory & grid-group typology |
|---|---|---|---|---|
| **What are the common criticisms, and limitations to applying the theory in an EA context?** | Does not account for values & beliefs;<br>Cannot anticipate social influences;<br>Challenged by increasing complexity of natural & social systems. | Temporally specific & Eurocentric;<br>Cannot be applied beyond its explanatory role;<br>Overly apocalyptic;<br>Ambiguous. | Narrow focus on individual;<br>Does not distinguish cultural influences;<br>Can be used for persuading or manipulating audiences. | Typology not adequately substantiated;<br>Over-simplistic;<br>Explanatory potential is compromised if cultural divisions regarded as porous. |

The assumption in the empirical chapters that follow my description of methods in Chapter 5, is that the alternate theories of practice underpin discursive claims about the nature of risk. Undoubtedly, the absence of certainty coupled with lack of trust, means that all claims are susceptible to dissent. The discourse perspective presented in the previous chapter offers diagnostic features of risk including the anticipation of harm, threat to an object of value and the need for a strategy. What the case studies add to this diagnostic is an appreciation of social practices by which stakeholders strive to resolve uncertainty and promote solutions relevant to their goals and aspirations.

# Chapter 5

# Methodology

The purpose of this chapter is to detail the methods used to address my research questions – how the realist interpretation of risk manifests in IA, what type of alternate discourses of risk are relevant, and how might a multifaceted interpretation of risk assist practitioners in understanding competing constructions of risk as a reflection of stakeholder practice and power dynamics. My reliance on discourse analysis is particularly relevant to the reference to "competing constructions" in my third research question, a phrase also included in the title of the thesis. This alludes to the philosophy underpinning my methodology - the central notion of discursive struggles over the meaning of risk. Discourse analysis, therefore, provides the means by which I acquire the knowledge to respond to the research questions.

Even though I have allocated concepts, theories and method to separate chapters, I have underscored in preceding sections, and reiterate here, that these three components of the research are closely interwoven:

> *Discourse analysis cannot be used as a method of analysis detached from its theoretical and methodological foundations…theory and method are intertwined and researchers must accept the basic philosophical premises in order to use discourse analysis as their method of empirical study* (Jørgensen & Phillips, 2002:3-4).

In presenting my methods, I therefore begin by providing a broad overview of the research design, focusing on the intersection between concepts, theory and method. I follow this with a description of several studies in which scholars have explored techniques of discourse analysis for case study research, highlighting relevant lessons for my empirical research. I then explain my methods in more detail with respect to my case studies, referring to both opportunities and challenges I encountered in operationalising the discourse analysis methodology.

## Research design

The social constructionist school of approaches in which this research is located, albeit a very wide field of study, is chiefly concerned with the generation of knowledge, how knowledge is exchanged and "the importance of identity in the constitution of interests and action" (Price & Reus-Smit, 1998:261). In aligning this research to the social constructivist perspective, I am aware of the limitations of this approach - as cautioned by Joseph (2004) the transitive (knowledge production) realm is full of different theories, knowledge claims and views of the world. By reducing events to the knowledge we have of them, there lies a danger in denying actual events, of blurring the distinction between truth and falsehood and thereby reducing reality into performative/rhetorical constructs (Norris, 1992). Arguably, when it comes to a constructivist approach to studying risk, this possibility is less likely for reasons, previously stressed, related to ambiguity and uncertainty. Nonetheless, my approach to deploying a CDA methodology is not without an awareness of its shortcomings. I am mindful that, whilst CDA has its roots in a constructivist orientated philosophy, eminent thinkers behind this approach have not remained consistent in their allegiances (see Curtis, 2014). Fairclough and others sought to shift CDA toward critical realism by focusing on elements of social reality - an inclination which is reflected in my emphasis on social practices in my case studies.

Foucault's philosophy, in which earlier accounts of discourse analysis are rooted, have also evolved through several phases. As explained by, among others, Joseph (2004), Curtis (2014) and O'Farrell (2005), his early works are heavily influenced by structuralism whereas his later work moves away from discourse and is more specifically concerned with practice and power (Joseph, 2004). In Chapter 3, I have attempted to embrace aspects of Foucault's earlier and later perspectives, in respect to how the production of knowledge is connected to argumentative struggles - where 'truth' is appropriated via the exercise of power (Sharp & Richardson, 2001). Accordingly I subscribe to the idea of discourse competition (as reflected in the title of this thesis), i.e. that "different discourses struggle to monopolise the production of truth" (Jørgensen & Phillips, 2002:181).

As previously emphasised, discourse analysis is more than a research tool - its deployment requires an appreciation of concept, theory and method. In line with the notion of competing discourses, my analyses in Chapters 6 - 8 are underpinned by a set of epistemological ideas or assumptions, as explained by Burr (1995). These include the following:

- Reality is only accessible through categories of knowledge, so our representations of the world are not reflections of what is 'out there' but are products of this categorisation or, in discourse analytical terms, products of discourse.
- Ways in which we understand and represent the world are historically and culturally specific and contingent, meaning that they change over time.
- Knowledge is created through social interaction and knowledge claims are asymmetric - some ways of knowing will be assumed by their claimants to be hegemonic and, therefore, privileged over other ways of knowing.
- Discourse study, in itself, is a critical rather than a neutral endeavor in the Foucauldian sense – the research accordingly aims to disrupt and expose what is unseen and taken for granted.

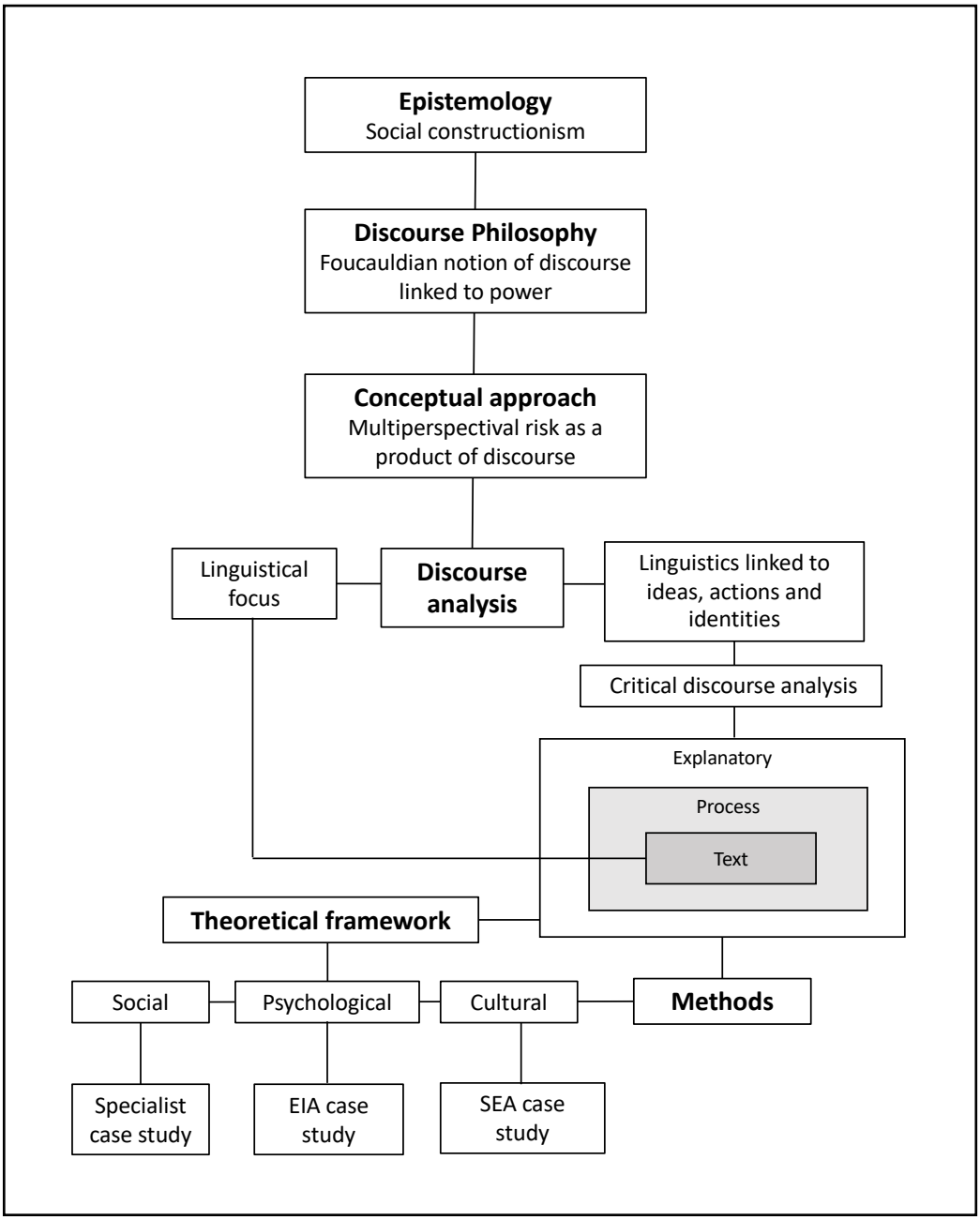
These postulates, in respect of my research, imply that discourse about risk is essentially a product of different ways of knowing about what risk "gets attached to", and these ways of knowing are constructed and incomplete (Dean, 1999:25). The advantage of Fairclough's model for CDA, as I have depicted it in Figure 1, is that it 'stretches' the notion of discourse from being solely linguistically focused, to incorporating ideas and actions, thereby reflecting elements of the social. Accordingly, the two inner dimensions of the model, focus primarily on discursive elements of discourse, whereas the third dimension covers non-discursive elements, or what Fairclough refers to as social practices (Fairclough, 1992).

As conveyed in the previous two chapters, an explanation of social practices cannot be arbitrary – it needs to be supported by appropriate theory. The theoretical lenses which I use to account for wider social practices include the social, psychological and cultural theory, as described in Chapter 4. These are applied respectively to my three case studies: a specialist study for a bulk fuel storage facility at Cape Town harbour, an

EIA for a proposed nuclear power station, and a SEA for possible hydrofracking for shale gas in the Karoo.

To clarify my research design, I have depicted the links between concept, theory and method in Figure 5. The graphic shows the complete methodological package: a socio-constructivist epistemology from which discourse analysis stems; a Foucauldian philosophy of an inextricable relationship between discourse and power; a conceptual framework that is Fairclough's three-dimensional model of CDA; and three supporting theories of social practices (the risk society theory, psychological theory and cultural theory). Each of these components bear on the methods used in the case studies. Before detailing these, I will refer to some examples of how discourse analysis has previously been operationalised as method for environmental case study research.

Figure 5: Research design illustrative of the relationship between theory and method




## Precedents for applying discourse analysis in case study research

Crowe and colleagues (2011) identify the primary benefit of case study research as allowing a multi-faceted exploration of what are often complex theoretical issues in 'real-life' settings. Consequently, it is the context as well as the phenomenon therein that is important for empirical research focusing on individual cases, particularly given

that the boundaries between a phenomenon and the context may not be clear (Yin, 2011). As one would expect, the use of case studies is ubiquitous in the relevant literature when it comes to unpacking the environmental issues and controversy given their typical dynamic and interdisciplinary character. Case study research has also been relied on for exploring the effectiveness of IA. The latter is reflected in a review by Loomis and Dziedzic (2018) which identifies approximately forty case-based contributions to this topic between 1996 and 2016. Where studies focus on the IA documentation, researchers frequently make use of EIS review packages[6] which offer both qualitative and quantitative means of judging the performance of IA. There are, however, relatively few precedents for applying discourse analysis to case studies of IA, including textual and contextual dimensions. The examples that I refer to in this section do not all deal with IA specifically but share a reliance on discourse analysis as a research approach for better understanding environmental debates and controversy. They include:

- Hajer's (1995) analysis of the debate about acid rain comparing the UK and Netherlands, titled *The Politics of Environmental Discourse*.
- An article published in the *Journal of Environmental Policy and Planning*, drawing on two case studies explicating a Foucauldian approach to discourse analysis (Sharp & Richardson, 2001).
- A discourse analysis undertaken by Runhaar (2009) focusing on competing viewpoints between stakeholders and decision makers, affecting a SEA for the Dutch Wadden Sea policy, published in *Environmental Impact Assessment Review*.
- A study undertaken by Rozema and Bond (2015) also reported on in the *Environmental Impact Assessment Review*, in which they argue for discourse accommodation as a measure of IA effectiveness.

Each of these examples offers insights into how discourse analysis is applied to competing types of knowledge, relevant to my case studies in the chapters that follow. In addition to these studies, I have drawn more generally on the work of Alexander

[6] These include Environmental Statement Review Package (ESRP) (Lee et al., 1999), the European Commission's (EC) Guidance on EIS review (European Commission, 2001), and the review package developed by the Impact Assessment Unit of Oxford Brookes University (Glasson et al., 2012).

(2010, 2018), given this author's approach to combining linguistics and discourse analysis techniques, in respect of various environmental issues and debates.

### The politics of environmental discourse

The seminal work of Hajer (1995) titled "The Politics of Environmental Discourse" offers a comprehensive analysis of the debate around acid rain in two different settings – the UK and the Netherlands. The premise of his study is that "development in environmental politics critically depends on the *specific social construction* of environmental problems" (Hajer, 1995:2, emphasis added). Hence, in respect of the title of his book, "politics" is not limited to party politics or even governance. Rather it is indicative of a wider meaning for politics, which accounts for how "the social" is being constantly constituted in ways that suit some, but exclude others (Jørgensen & Phillips, 2002:36)

From a methodological perspective there are several features in Hajer's study that have helped guide my approach. The first is his reliance on a single issue – that is acid rain – to focus his analyses. In my research, the notion of risk is the equivalent: the "organising principle" for the discourse to be studied, assuming that alternate interpretations of the focal issue compete for hegemony (Boholm, 2016:3). As Hajer's study demonstrates, the research thus sets outs to examine granted asymmetries in power relations. Arguably, a reason why IA has been the subject of relatively few discourse analyses, is that this presumption is challenging for a discipline that strives to be value-neutral; in which public consultation is purported to offer an opportunity for a Habermasian-type discourse ethic and communicative rationality (see Simpson, 2016). Hajer's setting in government (parliamentary) structures, lends itself more readily to a "theatre of dissent"; an analogy that Boholm (2008b:119) applies to 'real-life' public consultation forums in IA.

Another key aspect of Hajer's approach is his application of an overarching theoretical lens. In his study, this is the theory of ecological modernisation, although he also applies other lenses, including that of Ulrich Beck's risk society which is the same lens that I apply to my first case study. The theoretical lens anchors the study and connects

the narratives in the separate geographic localities in which the debate about acid rain takes place. In my case studies, I draw on a distinct theory for each example, but these theories are linked in my broader conceptual framework, that is the risk continuum, as explained in the first part of the previous chapter.

A third insight provided by Hajer's study relates to the identification of paradigmatic discourses. He identifies this as having to do with the "apocalyptic" story lines that shape the public discourse on acid rain (Hajer, 1995:251). A paradigmatic element in relation to my case studies relates to what Laclau and Mouffe refer to as the "discursive field" (Laclau & Mouffe, 2001:xi). Accordingly, each of my case studies is positioned in the energy debate happening in South Africa. This implies that there are certain archetypal discourses that cut across the three studies (for example in relation to renewables versus fossil fuels).

Related to the existence of archetypal discourses is what Hajer calls "emblems". These are issues that "stand out in a particular period and dominate public and political attention" (Hajer, 1995:5). Nuclear energy for example has achieved, over several decades, a kind of emblematic status throughout the world as a source of high consequence – low probability technological risk. I have referred in this regard to the idea of exceptionalism (Hecht, 2010) in Chapter 7. Hydrofracking also has emblematic qualities, as will be discussed in Chapter 8.

A final feature in Hajer's study that has guided my approach, is the emphasis that he places on the institutional process that determines the identification of issues and associated "ways of arguing" (Hajer, 1995:169). In this respect it is important from a discourse perspective to see that knowledge and identities are contingent *in principle*, but in specific situations there are normative identities and ways of knowing that are acceptable and, therefore, meaningful (Jørgensen & Phillips, 2002). In my case studies I have, therefore, been attentive to the respective "discourse orders" provided by the specialist study, the EIA and the SEA; and the institutions within these orders in which routinised and naturalised forms of discourse develop. Relevant to these discourse orders is what Hajer describes as a "continuous power relationship that is particularly effective because it avoids confrontation" (Hajer, 1995:57). In my research

this is reflected to EAPs' aspirations to, as far as possible, avoid controversy, mediate conflict, and bring closure to debates.

Owing to its thorough exploration and explanation of several discourse related concepts, Hajer (1995) is cited in many Foucault-inspired studies. However, where his work holds an advantage, is in the dedication of an entire book to exploring the theory and politics of discourse related to the single issue of acid rain. In this respect, he is able to do justice to a myriad of sources and intersecting narratives. Similarly, Flyvbjerg (1998) in his book entitled "Rationality and Power", presents an analysis in which he is attentive to the smallest detail of the narrative as he deconstructs a debate around planning in the Danish city of Aalborg which lasted over several years. My decision to include three case studies means that I have had to focus on specific segments of the debate and selected excerpts in the texts. In this regard, the contribution of Sharp and Richardson (2001) and Rozema and Bond (2015) refer to techniques for structuring the analysis, particularly in relation to how one selects parts of texts and aspects of debates to focus on.

#### Structuring a Foucauldian discourse analysis

In a comprehensive paper entitled "Reflections on Foucauldian Discourse Analysis in Planning and Environmental Policy Research", Sharp and Richardson (2001) combine their learning from two separate case studies in order to motivate and facilitate the discourse analysis research method in their discipline of environmental planning. Liz Sharp's case study considers the drivers behind local authorities' choices when it comes to investment in, and promotion of environmental initiatives/campaigns, and the manner in which such decisions reflected the broader environmental discourse in the UK around sustainable development (Sharp, 1999). Tim Richardson, on the other hand, applies discourse analysis to the disputed European Union policy process for Trans-European transport networks (Richardson, 1997).

Sharp and Richardson (2001:193) begin by emphasising that researchers using the term "discourse" are implicitly signifying an intention to favour the social constructivist epistemology. They proceed to highlight the need for researchers to

clearly explain their approach as either more narrowly linguistics-focused or has having a broader mandate encompassing "ideas and actions" as integral to discourse (Sharp & Richardson, 2001:193). They are partial to the Foucauldian approach because discourse is treated as a "complex entity" rather than a communicative exchange - "extending into the realms of ideology, strategy, language and practice, and shaped by the relationship between power and knowledge" (Sharp & Richardson, 2001:195). Although the authors do not refer to Fairclough's three-dimensional model, the "realms" of ideology, strategy, language and practice seem to dovetail with the explanatory, process and textual dimensions in Fairclough's methodology, and also overlap with the diagnostic qualities of risk which I have identified in Chapter 3. For this reason, I have relied on these words (ideology, strategy, language and practice) as 'thought prompts' in applying the different dimensions of Fairclough's model in my case studies.

Another aspect of discourse analysis that Sharp and Richardson (2001) stress, following Hajer's precedent, is the institution as a setting for the dominant discourse. For Foucault, the role of institutions in controlling discourse is a primary concern: regimes of knowledge are constituted by rules for what can and cannot be said and for what is considered to be true and false (Jørgensen & Phillips, 2002). As Sharp and Richardson explain:

> *His (Foucault's) work contains systematic attempts to understand how the apparently infinite potential for creating ideas and thoughts, and expressing them in language and actions, is controlled and constrained* (Sharp & Richardson, 2001:197).

In this respect, IA is the institutional mechanism beholden to the laws, regulations, procedures, templates, decrees, and formulas that shape the dominant discourse. In my selection of case studies, I endeavor to show how other types of policies are also implicated, with IA, in embedding and maintaining a prevailing interpretation of risk "constituting texts and practices that draw on each other in established ways to construct shared meanings, principles and aims" (Hardy & Maguire, 2016:83). As the case studies reflect, the result is that respective 'identities' (consultants, stakeholders, decision-makers, developers) are *enabled* unequally and in different ways.

A third important advisory that Sharp and Richardson (2001) offer is to show how discourse, or change in discourse, makes a difference to what happens in policy processes or in society more broadly. This highlights the importance of the explanatory dimensions of discourse in which actual decisions are made and change is prompted. In my case studies, I have endeavored to attend to the broader context for each IA, as well as to the assessment itself.

A fourth insight offered particularly by Richardson's study of transport networks, is concerned with "shifts in the relative influence of different discourses" (Sharp & Richardson, 2001:196). Attention to the discourse shifts that "shape the terrain" is a key part of discourse analysis (Sharp & Richardson, 2001:202). Following this guidance, I have taken care not to disregard what could be seen as peripheral or tangential discourses happening in the background to the more immediate and central arguments. Wider archetypal type discourses, as Hajer (1995) emphasises, will also shift, or evolve over time, either lending credence or detracting from the proximate arguments.

In addition to offering methodological advice, Sharp and Richardson (2001) identify several potential stumbling blocks to undertaking discourse analysis, which affects the usefulness of the methodology for environmental and planning policy research. These would-be pitfalls are also pertinent to my study. I refer to these and how I have dealt with them the discussion of my specific methods in the second part of this chapter.

#### Application of discourse analysis in IA

The above two contributions are useful precedents to do with environmental planning and policy making generally. As mentioned previously, the IA literature does not offer many examples of discourse analysis and none in which Fairclough's model is applied. There is, however, signs of increasing interest in discourse analysis in relation to IA. I refer to two examples below and situate them in relation to my research.

*Use of discourse analysis to contextualise a strategic assessment in the Netherlands*

A Dutch researcher, Hans Runhaar, has explored the application of discourse analysis in a number of studies focusing on IA, and SEA in particular (Runhaar, 2009; Runhaar et al., 2010, 2013). The study I describe here offers "a discourse perspective on how SEA contributes to decision-making" (Runhaar, 2009:200). Given the precedents described previously, it is apt that Runhaar's paper begins by stressing the need for "enhanced incorporation of insights from policy analysis, planning theory and political sciences" into IA practice (Runhaar, 2009:200). In Runhaar's view, these disciplines offer important lessons for IA, firstly, in relation to how practitioners interact with stakeholders, and second, for attending to the specific context in which IA operates.

Runhaar advocates the discourse approach as a way of better understanding environmental disputes, and for facilitating insights into how IA and its outcomes are perceived and employed in decision-making (see also Bartlett & Kurian, 1999). Although my approach is not based on Runhaar's research design in terms of content, Runhaar's and my approach have a similar point of departure in respect of the customary theories and practice that underpin the "classical" approach to IA:

> *Theory and practice often are found to be based on a classical model of decision-making, which assumes a central state actor that is able to steer society in a hierarchical way and where (scientific) knowledge is fed into decision-making processes in order to "rationalise" public policy* (Runhaar, 2009:201*).*

Against this backdrop, and relying on a Foucauldian notion of discourse, Runhaar is interested in why discourses become dominant and what causes this to change over time. In the case of competing interests in the Wadden Sea in the Netherlands, the debate over marine resources is presented chronologically with reference to key documents, articles and interviews (Runhaar, 2009). In his analysis he infers an emblematic status for the Wadden Sea, as ascribed to acid rain by Hajer (1995). In Runhaar's case study, an expressed intention to expand gas mining into the sea, prompted an non-government (NGO) led campaign in which the Sea was cast as "a symbol for environmental protection", embodied in the slogan "Hands off the Wadden

Sea" (Runhaar, 2009:205). There are parallels in this depiction with how the Karoo landscape is framed, as shown in my case study to do with hydrofracking in Chapter 8.

Where my approach differs from Runhaar's, is in the inclusion of theory of social practice as a lens to reflect on stakeholder behaviour. Fairclough's conceptual framework, depicted in Chapter 3, highlights the importance of couching the discourse analysis within other theories, although in the case of a less specific Foucauldian type approach, the only imperative is to address power relations and to take a critical stance in this regard. Nonetheless, in the absence of such theory, the context for the textual analysis is more ambiguous and it is difficult to connect the analysis with social changes. This is evident in Runhaar's conclusion which focuses primarily on the usefulness of the discourse analysis approach in prompting a wider perspective of the IA, and its potential to encourage practitioners to promote "discourse reflection by stakeholders involved" (Runhaar, 2009:208). In the example that I describe below, the authors start with a firmer intention - that is to frame discourse accommodation as a measure of IA effectiveness.

*Discourse accommodation as a measure of EIA effectiveness*

Rozema and Bond (2015) offer a study, drawing on a transport infrastructure case studies, to demonstrate their contention that effectiveness of IA is related to the process's ability to "accommodate civil society discourses" (Rozema & Bond, 2015:66). Unlike the more direct focus on discourse analysis in Runhaar's work, the intention of this study is to contribute to the broader effectiveness debate around IA (see also Bond & Pope, 2012; Cashmore et al., 2010; Jay et al., 2007). The discourse analysis is implicit in the manner in which Rozema and Bond identify the limitations of two transport related IAs with regards to accommodating public concerns that do not 'fit' with the sustainable development philosophy to which IA subscribes.

The authors of the study do not explain or justify their conceptual framework to the same extent as the other studies I have referred to, but certain key words and references suggest a predominantly Foucauldian interpretation of discourse: for example the suggestion that discourses can be used as strategic arguments (Rozema &

Bond, 2015:66), a reference to multiple civil society discourses (Rozema & Bond, 2015:67) and the description of their study in the conclusion as an "argumentative discourse analysis" (Rozema & Bond, 2015:71).

A challenge that these authors are clear about in describing their methods, relates to the amount of data they had to contend with in applying discourse analysis to IA. They managed this through coding, and the identification of themes. In sorting through comments raised by stakeholders, and responses these elicited from the consulting practitioners and scientists, the authors trace specific discursive threads which they categorise as "justification"; "party politics" and "ecological modernisation" (Rozema & Bond, 2015:69). By allocating discourse into these respective themes, they aim to test their hypothesis, that IA is unable to accommodate the full range of discourses, by "force of example", citing Flyvbjerg (2006) (Rozema & Bond, 2015:67). Their findings, therefore, demonstrate how certain issues are excluded from consideration because they fall outside of the dominant discourse. Rozema and Bond conclude their study with a recommendation that "discourses need mapping" to the fullest extent in relation to the suite of impact assessment tools (Rozema & Bond, 2015:71). Spotlighting the significance of discourse in IA, the authors pronounce as follows:

> *Discourses build upon and strengthen the internal cohesion between collective forms of reasoning manifested in the societal structures, practices and institutions around which impact assessment is played out* (Rozema & Bond, 2015:67).

Although this observation is not tied to a particular theory, the authors' reference to "collective forms reasoning" and "societal structures, practices and institutions" resonates with the social and cultural theoretical frames I apply to my case studies.

#### Learning from live research

A final point that I wish to make in relation to precedents and methodology, relates to what is happening in the wider world as I sit in a lockdown bubble writing a thesis about risk, during the COVID-19 pandemic. Thomson (2020:n.p.), in her research

writing blog, underscores the knowledge-making process "going on in front of our eyes". She rightly points out that we can actually see sciences plural:

> *Its global, its high stakes. It's highly political too – politicians say it's all about "the science" – as if the science were a singular thing, united, homogeneous, able to speak with one voice. As If it were fixed. No.* (Thomson, 2020:n.p.)

Questions about what is true, who to trust, and what kind of value is being put on aspects of our lives (and on life itself), are right in our midst. Choices we previously did not think twice about, require constant mini risk assessments - whether to go shopping, how best to exercise, is it safe to hug? Moreover, as Thompson stresses, "we can see which knowledges are politically favoured – it is apparent, in the ways in which scientific knowledges are not only made but taken up, that knowledge making is not a neutral process" (Thomson, 2020:n.p.).

The experience of the pandemic shows that research methodologies do not have to be justified in only an abstract and formal sense – they are connected to the way we live and how events unfold around us. Certainly, not a day goes by when I do not make connections between my research topic and the happenings in the global research lab that the world has become during the pandemic. For this reason, I have made intermittent references to the pandemic (and other contemporary events) and lessons to be taken about risk, and the interpretation thereof, throughout this dissertation.

## Research methods

As far as my specific methods are concerned, CDA's three-dimensional model offers a general approach, but as already stated Fairclough does not spell out detailed research techniques. These will depend on the combination of texts, processes and contextual influences that are unique to the individual discursive events. In operationalising CDA I draw on the precedents outlined above, and guidance offered by discourse scholars (particularly Alexander, 2018; Jørgensen & Phillips, 2002; and Janks, 2007), but my approach is also tailored according to the content and attributes of each case study.

In the remainder of this chapter, I describe the methods used in the discourse analysis in relation to the following:

- Selection of case studies
- Matching the theory to the case studies
- Publications relevant to developing my research methodology
- Applying critical discourse analysis
- Techniques used to analyse the data in each case study
- Use of surveys and interviews to enrich the empirical findings
- Ethical considerations and researcher bias
- Referencing and presentation.

**Selection of case studies**

The case studies that I explore in the chapters that follow have an instrumental function - explained by Crowe and colleagues (2011:1) as studies which offer an "in-depth, multi-faceted explorations of complex issues in their real-life settings". In this instance the complex issue is risk and the interpretation thereof in IA. Access to a deeper level of understanding is facilitated by a combination of concept and theory that comprise the discourse analysis package, as outlined in my research design. I treat the case studies as part of this package. These cases are temporally and spatially specific. They are, nonetheless, illustrative of aspects of the socio-cultural theories presented in Chapter 4. In keeping with Flyvbjerg's (2006) classification of information-orientated paradigmatic case studies, each is intended as an example, or what Flyvbjerg refers to as a "prototype" (Flyvbjerg, 2006:232), of discursive events in which risk is constructed from varying perspectives along the risk continuum

There isn't a prescriptive approach or standard by which one can determine whether or not a case has prototypical value. As Flyvbjerg (2006) points out, the social science researcher often relies on intuition in the choice of cases, but must be still be able to account for one's selection in a manner that is sensible to members of the scholarly community of which we are a part.

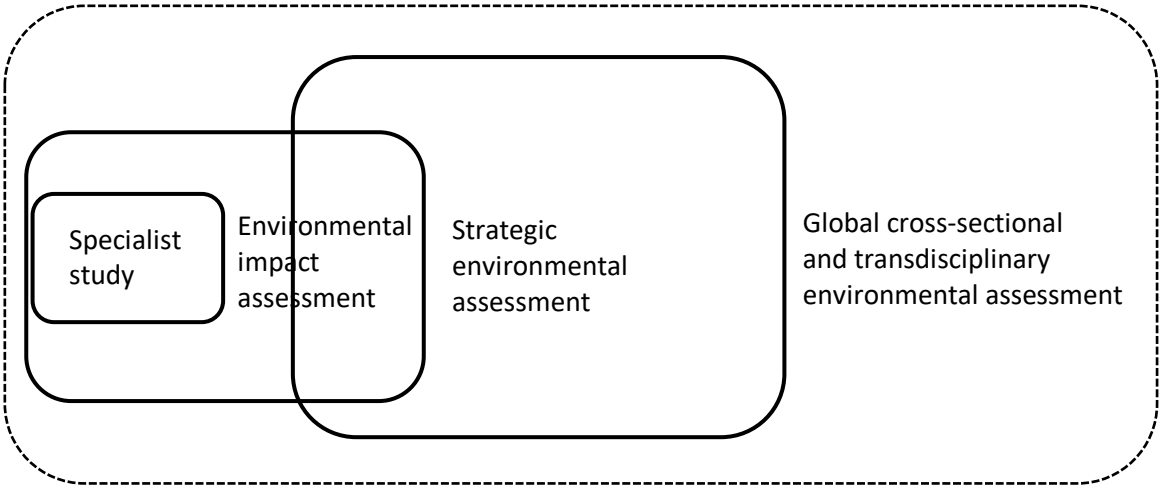
My choice of case studies is primarily a reflection of my interest and experience in IAs, linked to environmental debates in which risk is a central consideration. In order to mobilise a discourse analysis methodology, I also required case studies that were a good fit in relation to the concepts, theory and methods that comprise Fairclough's complete package. In other words, they should be useful for demonstrating the connection between the relevant texts and the context in which these are produced. From a practical perspective, the study material needed to be accessible, and preferably pertinent to contemporary problems and concerns in the South African setting. It was also an advantage to use cases that I was familiar with, but not directly involved in as a professional EAP, to avoid ethical conflicts. In this regard, (Giddens & Dallmayr, 1982) identify a distinct advantage for researchers that possess a level of skill and understanding in the activities being described in the case studies.

Bearing these issues in mind, the case studies presented in Chapters 6 – 8 have several suitable features. Firstly, they are each connected to the energy debate, which at the time of writing is one of the most topical issues in South African politics. This means that certain paradigmatic/archetypal discourses around energy and climate change (particularly renewable and non-renewable sources of power) are consistent in all three cases. In discourse analysis terms, the energy debate can be described as a "field of discursivity" providing a general reservoir of meanings (Laclau & Mouffe, 2001:111). Against the backdrop of a shared discursive field, it is easier to focus the research on the contingencies characterising the more specific forms of discourse therein.

Another consideration in my choice of case studies is to do with the scalar aspects of IA. In this regard I wanted to show how risk threads its way from the most fundamental component of IA (that is the specialist study), across the intermediate scale of the EIA, to the wider concerns of the SEA (Figure 6). Each of these components, in discourse analysis terms, represent a particular "order of discourse" defining the "terrain" in which the discursive struggle takes place (Jørgensen & Phillips, 2002:27). I am aware that assessment and forecasting takes place beyond the scale of SEA, particularly in respect of climate change and other global trends (Retief et al., 2016) (see Figure 6). I am also mindful of the many variations of IA, including social impact assessment, sustainability assessment, technology assessment, and so

forth (Bond & Pope, 2012; Morrison-Saunders & Fischer, 2006; Morrison-Saunders & Retief, 2012). In this thesis, however, I concentrate on the specialist study, the EIA and the SEA since these constitute the 'mainstream' practice of IA in South Africa (Kidd et al., 2018).

Figure 6: Scalar dimensions of Impact Assessment




A third requirement of the case studies was for them to be relevant and contemporaneous, but also complete. Fairclough was concerned about how discourse is itself a factor in securing power. In this respect, CDA should focus on the discursive practice that constructs representations (in this instance, the representation of risk), and the role that such practices play in "furthering the interests of particular social groups" and inducing social change (Jørgensen & Phillips, 2002:63). The real-world implications, or consequences of each case study is intrinsically relevant to the analysis itself, as well as to the research questions.

Although each of the three theories of social practice bears relevance to each of the case studies, drawing on all three theories in each instance would overly-complicate my research design. The review and comparison of the theories in Chapter 3, points to aspects of one or other theory that best matches the case studies. I have flagged key features of the theories relative to the case studies in the Table 4. These quintessential linkages do not discount the relevance or aspects of each of the three theories to either of the examples. In the case study chapters that follow, I have cross-referenced the other theories where relevant.

Table 4: Key theoretical attributes applicable to case studies

| Discourse order | Theory | Case study |
|---|---|---|
| **Specialist study** | **Risk Society (Ulrich Beck):** | **Risk analysis for a bulk fuel storage facility at Cape Town Harbour** |
| Fundamental component of IA in which expert knowledge is produced as a basis for identifying, assessing and evaluating impact significance. | Focuses on the institutionalization of risk in respect of its management and distribution.<br>Critical of "acceptable levels" of risk as calculated by scientific bodies, and selectively imposed on sectors of society.<br>Adopts a relatively realist conceptualisation of risk, considering the manifestation of risk in forms of pollution and harmful consequences associated with the side effects of advanced technologies, which tend to be invisible and insidious. | Analysis embedded in a management framework which institutionalizes the distribution and of risk.<br>Reliance on the scientific formula of risk calculated relative to thresholds of tolerability.<br>Assesses potential of gas/vapour leaks, undetectable without scientific instruments.<br>The assessment includes simulated representations and associated assumptions to make determinations about harmful consequences as if the event has already happened. |
| **Environmental Impact Assessment** | **Psychological Theory (Paul Slovic and colleagues)** | **EIA for a proposed nuclear power plant at one of three sites on the South African coastline** |
| Legislated and ubiquitous form of IA in South Africa focusing on "listed" project activities and including specialist studies, public participation and impact assessment and evaluation | Focuses on perceived risk, the affect heuristic, and a role for emotions.<br>Explicates response to low probability and high consequence risks where there is often a lack of alignment between expert findings and public perceptions.<br>Emphasis on the expert–lay person divide in respect of risk perceptions and risk communication techniques. | Regulated requirement to consult stakeholders and record comments and responses.<br>Emblematic technology that is symbolic of low probability and high consequence type risk.<br>Nuclear technology linked to historical events in which there are strong associations with emotions covering fear and anxiety. |
| **Strategic Environmental Assessment** | **Cultural Theory (Mary Douglas and colleagues)** | **SEA for proposed hydrofracking for shale gas in the Karoo Basin** |
| Unregulated tool in South Africa focusing on assessing plans, policies and programmes | Focuses on the relationship between risk perception and worldviews.<br>Assumes that stakeholders can be arranged in solidarities/cosmologies that are culturally predisposed to certain attitudes about risk. | Strategic character of assessment suited to a theory that encompasses worldviews of stakeholders.<br>Distinct quality of stark and scarcely populated Karoo landscape susceptible to appropriation by diverse groups of stakeholders. |

| Discourse order | Theory | Case study |
|---|---|---|
| | Risk responses linked to maintaining solidarities and support for particular "myths of nature".<br>Defenses against risk and uncertainty include assigning blame, guarding of boundaries and othering those who do not share similar worldviews. | Report produced by a consortium seeking to advance a consolidated view of the benefits and drawbacks of fracking technology.<br>Key issues advanced by representative organisations.<br>High level of uncertainty about the occurrence of shale gas and feasibility of the technology. |

**Publications relevant to developing my research methodology**

During this research I co-authored, with members of my supervisory team, two method-related journal papers. Both papers played an important role in the development of my approach to this research and the techniques I have used in the case studies. The papers were also an important part of learning to distinguish constructionist and realist paradigms. Although some paragraphs and arguments in this thesis bear semblance to what is in these two articles, neither has been reproduced in their entirety in this dissertation.

The first paper, published in Environmental Impact Assessment Review 79 (2019), is titled: *Applying social risk theory to competing constructions of risk in environmental assessment* (Day et al., 2019). The article reflects my choice and exploration of the three sociocultural theories that provide the lens for my case studies in this thesis. The value of the research for this publication is that it involved consideration and comparison of a range of theories, to identify which would be most appropriate in the IA context. The submission of the article to a journal specifically targeted at environmental assessment practitioners also provided an opportunity to gauge the usefulness of these theoretical contributions to both the scholarly and professional cohort. In the article, the origins and content of the risk society theory, the psychometric paradigm and cultural theory are reviewed, focusing on their relevance to the practice of IA.

The second paper, published in Social Dynamics 47(1) (2021) is entitled: *Speaking for the trees: a study of the relationship between discourse, power and organisational culture in competing constructions of nature* (Day & Patel, 2021). The paper deals with a case study in Cape Town, focusing on a heated controversy that emerged over the felling of pine trees in an urban park. My co-author and I draw from Foucault's theory of power, and utilise Fairclough's CDA to explore how opposing arguments were shaped by cultural perspectives of what nature should look like and the purpose it should serve. In this instance a scientifically framed and institutionally supported discourse of the conservation authority was pitched against the symbolically oriented discourse of a community based organisation (CBO) representing ramblers, joggers, horse riders and dog walkers. The authority stood for removal of 'alien' trees to allow for the re-establishment of endemic 'fynbos'. The study shows how this dominant discourse of nature, rooted in the assumed supremacy of science and expert knowledge, was challenged by a multivalent and contextually moulded discourse of nature as amenity.

An important learning from this second investigation related to the application of a specific theoretical lens to the dispute. The constraints and freedoms this allowed, enabled me to draw justifiable conclusions even if these conflicted with my own subjective opinion/worldview (which is biased toward the felling of the pine trees to allow restitution of indigenous vegetation). An anonymous peer reviewer of this second paper felt that we should have developed a stronger socio-political critique, with reference to the apartheid legacy in South Africa and its impact on parks and recreational spaces. This critique prompted useful consideration of how much one can read into discourse and the limits one applies, bearing in mind an inherent bias in a Foucauldian inspired discourse analysis toward perspective of the less powerful (Janks, 2007). This dilemma and its bearing on my approach to the case studies in this thesis is discussed further under "Researcher Bias".

#### Application of critical discourse analysis

In applying Fairclough's model to the three case studies in this thesis, I have not imposed the three dimensions of CDA in a rigorous and categorical manner. Instead,

the inclusion of each dimension serves as a guide to the content rather than a structure for each analysis. Bearing in mind that the entry point for the analysis can be via any of the dimensions, my interpretation of what is relevant to each dimension for the purposes of my research is as follows.

*Descriptive dimension (linguistics level)*

The innermost textual analysis is the most linguistically orientated component of the CDA model, in which the specific elements of language-use are made relevant to meaning and the identity of the speaker/writer. Sources for the text dimension should be verbatim forms of language use (Fairclough, 2001). Specifically in relation to IA, the textual dimension offers an opportunity to reflect on "how technical skills (forecasting, surveying, modelling) act a persuasive imagery within texts, and to better understand why those tropes help to persuade some audiences but not others" (Throgmorton, 1992:29).

In my case studies the text dimension comprises several discourse genres including the respective assessment reports, relevant or influential policy documents, court cases, meeting records, news reports, minutes of parliamentary portfolio meetings and so forth. The primary focus of the textual analysis in each case is on the IA reports themselves. In South Africa, IA reports are all publicly available, and were therefore easily accessed

For the textual dimension, the aim is to consider how discourse is textually activated to support a particular interpretation of risk by paying attention to what is being communicated, how it is being expressed and who is creating the knowledge. There are many sources that offer guidance on textual/language analysis. A common source of this guidance is Halliday's original concept of systemic functional grammar (see Halliday, 1978; Halliday & Matthiessen, 2013). A key assumption behind this concept is that there is meaning in linguistic choices, and that these should be systematically related to a wider socio-cultural framework. Thus, the subject of analysis should not be insulated, but approached from the perspective of different disciplines. In adapting Halliday's philosophy on language to study of ecological and environmental discourse,

Alexander (2010:4) underscores the need to "factor in the social and the political ramifications" as paramount. For the descriptive dimension of my case studies, I referred to synopses of well-established guidelines in Janks (2007) and Alexander (2010). Accordingly, my textual analyses in the case studies concentrates on the narrative qualities and modality in the text/symbols, including metaphor (indirect comparison); euphemisms (understatement); interdiscursivity (borrowing from other discourses); hedging devices (used to limit or qualify claims) and nominalisation/ passivation (use of nouns in place of verbs to de-emphasise agency).

*Interpretive dimension (level of discursive practice)*

The interpretative (also referred to as 'process' dimension), for the purposes of my research, covers the rules and procedures germane to the order of discourse (that is the specialist study, EIA and SEA). These institutional constraints are relevant to what is possible to say and how it should be said. In this dimension there tends to be an element of naturalised or sedimented discourse borne of a history and arrangements, such as the generic or established terms and function of a specialist study, EIA and SEA. Sources for the process dimension includes the legislation, guidelines, protocols and other relevant grey literature that defines the process of IA in South Africa. This material either forms part of my personal library associated with my profession as an EAP and studies in environmental law, or was accessed from the university libraries and relevant internet sites.

*Explanatory dimension (level of social practice)*

Fairclough (1992) describes the explanatory/contextual dimension as the "social matrix" of discourse, involving the transdisciplinary integration of different theories. The theories, as presented in the previous chapter, are relevant to the broader debates, institutions, and conditions outside of, but related to each case. The content of this dimension for the purposes of my case studies is linked to a general awareness of, and attention to happenings in the wider energy debate or "discourse field" that forms the backdrop to the textual and process sources (discursive elements) in the inner two dimensions. Mobilising the three theories described in Chapter 4 in a manner which

reduces ambiguity and focuses my analysis, meant I needed to stay abreast of energy issues: reading relevant newspaper articles, opinion pieces, and (prior to the advent of COVID) attending public participation meetings, conferences, and forums in which matters related to the case studies are discussed and debated.

**Data analysis**

Data analysis is a term that is more appropriate to quantitative research, but I use it here to refer to productions of discourse, inclusive of texts, images, speech or individual words (Thomson, 2020). In each case study, relevant real-world data was generated in varying quantities during the discursive event. As indicated by the precedents discussed in the previous section, a Foucauldian-type discourse analysis can be applied to debates, controversies and assessment across various discourse orders and geographies. Fairclough's translation of Foucault's philosophy into CDA includes a strong textual focus (Jørgensen & Phillips, 2002). In this respect, CDA is best suited to bounded instances of text, as opposed to a combination of large texts like one finds in IA. Even where CDA is not defined as a component of the methodology, sheer quantity of material can be a significant challenge to discourse studies, as highlighted by Sharp and Richardson (2001) and Rozema and Bond (2015).

Given the distinct types of data generated in each of my case studies, I could not rely on a standard approach to dealing with the information. Each case had to be treated individually.

*Specialist study for a bulk storage facility at Cape Town harbour*

With the expert risk assessment of the proposed bulk fuel storage facility at Cape Town harbour, it was possible to cover the entire specialist report in the analysis, highlighting the bits of texts that came within the focal range of Ulrich Beck's risk society theory. Accordingly, I concentrated on the assumptions, disclosures and disclaimers in the report, to illustrate how uncertainty is transformed by experts into manageable risks through a particular type of discursive appropriation. For the process dimension I relied on relevant legislation and the discourse produced by the institutional structures and the 'voices of dissent' in the vicinity of the harbour. For

the explanatory dimension of the analysis, I drew on spatial information to reflect on the locality of the facility relative to other land uses, as well as the proceedings of parliamentary debates in order to track the social changes in the wider political context for the fuel storage depot.

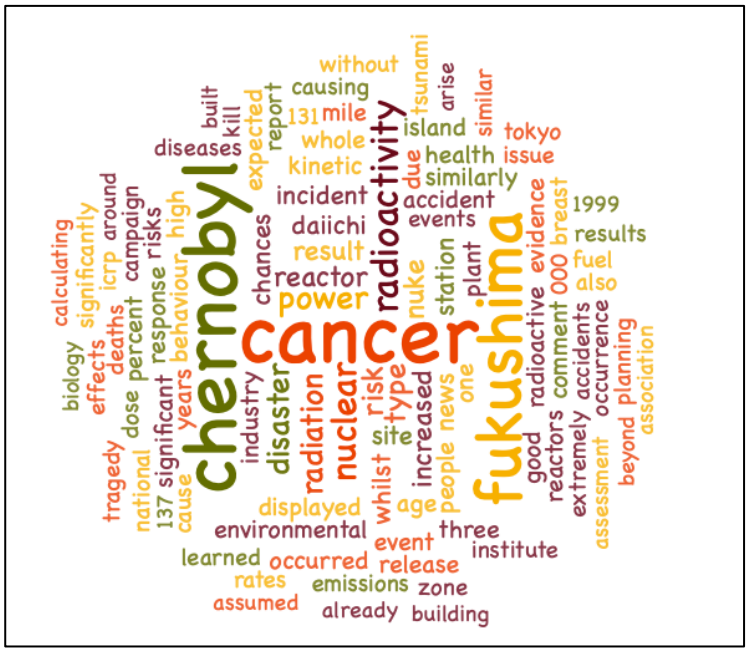
*Environmental Impact Assessment for a proposed nuclear power station*

The EIA for the proposed nuclear power station was the largest and most complex of the case studies in terms of the quantity of data. In respect of the choices that I had to make about which discourses to focus on, the lens of psychological theory and related ideas about heuristics and emotions, directed me to prioritise the public consultation process. In this respect, the authors of the EIA had compiled a detailed Comments and Response report during the near decade long assessment. The report is presented in a tabular format, comprising over 1500 pages of text. Using an approach comparable to Rozema and Bond (2015), I used the NVIVO software package to code the text. Guided by my risk diagnostic (described in Chapter 3), including harm, value and strategy, I designated discourse "nodes" to structure my analysis. These included harm/danger; value/trust and alternatives. Word clouds was a useful tool in providing a visual summary of comments and responses related to each node. An example of such is provided in Figure 7. I then translated the nodes into three distinct themes which I used to structure the discourse analysis:

- Nuclear radiation and the fear factor, in relation to harm
- Emotions and moral dimension of nuclear power, in relation to value
- Alternative energy sources, in relation to strategy

Once I had identified these themes, I extracted and categorised the comments and responses, producing a smaller table for each theme. I was consequently able to focus the lens of the psychological theory on a more manageable pool of data from which to select key bits of texts to include in my analysis. The wider explanatory dimension involved my interpretation and summation of the highly politicised and controversial backdrop of the EIA drawing primarily on government policy documents, news reports and relevant court cases.

Figure 7: Word cloud sample generated from comments and responses using NVIVO




*Strategic environmental assessment for proposed hydrofracking in the Karoo Basin*

Given the strategic character of the assessment of hydrofracking for shale gas in the Karoo, the wider debate and archetypal discourses that stimulated the controversy were an important area of focus in my third case study. Thus, for the explanatory dimension, I concentrated on communicative exchanges and events leading to the decision to commission the SEA. I also sought evidence for discourses representing the 'border' and 'centre' aligned solidarities in cultural theory, from the websites of implicated stakeholders. This information enables me to demonstrate how the opposing views in the controversy are aligned to distinctive 'myths of nature' underpinning constructions of risk.

In respect of the two inner dimensions, I focus on the Summary Report for Policy Makers included in the SEA. This shortened and consolidated version of assessment provides examples of text to demonstrate the relevance of cultural theory to how risk is framed by the scientists and EAPs. Characteristically of discourse analysis, the meaning that is read into the text in this component of the analysis is inherently subjective and suggestive, the intention being to read between the lines and uncover

what may be taken-for-granted – the implications of this intention is discussed further on, under the heading Researcher bias.

#### Survey and interviews

Whilst CDA is underpinned by the idea that discourse exists and has influence beyond the text, there are still temporal boundaries to discourse analysis. As explained by Sharp and Richardson (2002), a discourse event has influence at a specific time in relation to a particular struggle. This poses challenges in terms of extrapolating the results of empirical analyses and offering wider recommendations. Even so, Flyvbjerg (2006) is disparaging of the notion that one cannot generalise from a single case:

> *One can often generalise on the basis of a single case, and the case study may be central to scientific development via generalization as supplement or alternative to other methods. But formal generalisation is overvalued... whereas "the force of example" is underestimated* (Flyvbjerg, 2006:228)

Consequently, the primary source of insight into the meaning of risk is from the case studies. I have, however, also enriched my findings with information from with select interviews and a small survey of EAPs.

The techniques I used to gather information were circumscribed by lockdown conditions due to the COVID-19 pandemic. I therefore used a combination of an on-line survey approach, and two in-depth interviews using the Zoom tool to interact with these participants 'face-to-face'. In selecting participants, I drew on a several sources including my professional network, people I had studied environmental management with, and the database of registered Environmental Assessment Practitioners Association of South Africa (EAPASA). My selection criteria included, first that the EAPs having at least five years of experience in managing IAs, and second that they represent diversity companies/affiliations.

Following guidance provided by Fowler and Cosenza (2009), the survey was designed to be succinct but open-ended so that the practitioners could be precise or more expansive in their answers. The targeted nature of the survey ensured that all respondents would have a consistent understanding of the context for the research.

One ‘test survey’ was completed which resulted in some minor edits to the survey content. The final questions were as follows:

- How is “risk” defined in the discipline of Impact Assessment in South Africa?
- What opportunities or challenges does this definition pose for the practice?
- Has the meaning of “risk” generally changed since you have worked in the field?
- If you think it has, what are the reasons for the change?

The survey was sent by email to 20 professional practitioners working for 20 different consultancies, or practicing independently, in localities across South Africa. The response rate of was 48% and all responses came by return email between 2 March 2021 and 1 April 2021.

In addition to the survey, the two ‘elite’[7] interviews were conducted with practitioners with more the 15 years of experience locally and internationally. The respondents are past-Presidents of the International Association of Impact Assessment (IAIA), and have also been involved in developing best practice guides for the South African IA discipline. Each of the interviews lasted an hour, including my brief explanation of the purpose of the study.

The classification of these interview, according to Rapley's (2004, 2010) typology, matched the description of conversational or in-depth interviews, the aim being to encourage the participants to offer “thick descriptions” and detailed responses (Rapley, 2004). The format was loosely guided by the same questions used in the survey but as both interviewees were known to me and shared an interest in the subject of risk and IA, the interaction was akin to what Rapley (2004:16) describes as a “social encounter” in which interviewer and interview collaborate in the production of accounts based on “experience, feelings and thoughts” about the topic. As explained by Punch (2013) in the less formal, or unstructured, interview setting the questions are used to more get the interview going and keep it moving. Other questions “emerge as

[7] I use ‘elite’ according to the qualitative research meaning proffered by Harvey (2011), referring to individuals who have an “ability to exert influence” through “social networks, social capital and strategic position within social structures” (Harvey, 2011:433).

the interview unfolds, and the wording of those questions will depend upon directions the interview takes" (Punch, 2013:145). The interviews took place on 15 March 2021 and 19 March 2021 and were recorded with permission from the interviewees. Transcripts were generated using an on-line transcription tool.

It is important to note that interviews and surveys were sources of information to triangulate insights provided by the case studies, and were not the subject of discourse analysis themselves. Both formats provided useful information, however, the in-depth interviews offered richer material for the purposes of adding to the credibility and validity of the conclusions I drew from the case study materials.

### Ethical considerations

The only component of the research subject to formal ethical clearance was the survey and interviews that I describe above. Both of these were subject to ethical clearance received from the University of Cape Town's Faculty of Science Research Ethics Committee on 4 February 2021 (ref. FSREC 012-2021). By agreement with the participants and in accordance with the ethics clearance certificate, the survey respondents and interviewees are cited anonymously.

Another ethical dimension of the research relates to the identity of the actors involved in the case studies. Here it must be noted that all IAs in South Africa are in the public record. In addition, the names of people who participate in the public participation process are usually included in an Interested and Affected Party register, and in the minutes of meetings. Even so I have chosen for the purposes of this research not to name the authors of reports or individual stakeholders as these are not relevant to the research aims. On the contrary, in respect of government institutions and para-institutions I do include the descriptors indicative of their function and jurisdiction. I have also named the larger private companies and organisations referred to, such as Shell and Chevron. Such large corporations have become 'household' words over many years, such that their names come with connotations relevant to how they are perceived in relation to risk.

**Researcher bias**

A key consideration associated with the discourse approach is the bias that is inherent in the many choices the researcher has to make in relation to each component of the 'package' including concepts, theory and methods. It is inevitable that one will select techniques and supporting materials favouring some lines of enquiry whilst closing off others. In this respect, Sharp and Richardson (2001:204) highlight a common criticism of Foucault's work - that he was selective in use of sources, quoting only from those "that supported his broad observations". Flyvberg's (2006) discussion of case study research in the social sciences also raises the question of bias toward verification, framing this as a fundamental human characteristic, and it can occur in respect of may different aspects of one's research. Notwithstanding this impulse, Sharp and Richardson (2001) also point out that researcher bias is not necessarily a weakness: "On the contrary… the social constructivist perspective would make it difficult to deny the influence of the researchers' partiality or subjectivity on the research process" (Sharp & Richardson, 2001:207).

For this research it is relatively simple to justify a level of bias on the grounds that "critical" discourse analysis is not meant to be a neutral endeavour: it is a political exercise that assumes unequal power relations and should "take the side of oppressed social groups" (Jørgensen & Phillips, 2002:64). Accordingly, I am sympathetic toward less obviously powerful actors, particularly public stakeholders who are consulted but do not have an institutionally prescribed role in the IA process.

A further source of bias, underscored by Jørgensen and Phillips (2002:21), relates to the researcher being "part of the culture under study". As far as this applies to me, it is inevitable that, as an assessment practitioner, I share taken-for-granted meanings in the both the context for, and content of the research material. In adopting a constructionist perspective, I am mindful of the likelihood that some of what I treat as findings may equally be regarded as arbitrary opinions. An article by Thompson and Dean (1996), offers the following in this regard:

> *The majority of risk constructivists have simply not thought about the epistemological and ontological implications of their claims. We think that many constructivists overstate*

> *their position in an attempt either to stress the importance of social context in selecting and framing which risk issues to address, or to stress how factors we identify in the contextualist view may be more important than probability or consequence. We think they might choose their words more carefully if they were aware of the fits that they cause* (Thompson & Dean, 1996:371).

In a response to this, Horlick-Jones (1998:83) argues that this opinion serves only to demonstrate "how threatening constructionist ideas are viewed in some quarters". For Horlick-Jones and other commentators (for example Alexander, 2010, 2018; Irwin et al., 1996; Jasanoff, 2012; Sarewitz, 2004; Wynne, 1996, 2006, 2013) recognising and uncovering ambiguities and subcultures in scientific discourse is a moral and political imperative.

These types of debates warrant some trepidation about the discourse analysis approach for this research. To extract and examine 'pieces' of text to support a particular argument is a subjective process, and it goes without saying that a discourse analysis will be less rigorous that quantitative, hypothetico-deductive methods. In justification of qualitative discourse studies, Flyvbjerg (2006) points to how such research is intended to 'close in' on real-life situations - to uncover the discreet and apparently insignificant truth, which, when closely examined "would reveal itself to be pregnant with paradigms, metaphors, and general significance" (Flyvbjerg, 2006:238).

Allied to other proponents of the CDA approach, I acknowledge that my analyses in the following three chapters are not systematic evidence-based studies from which I can derive unequivocal conclusions. The enquiry is, as Alexander (2010:214) describes, an idiosyncratic process of "unearthing evidence, gathering arguments, thinking, questioning, investigating, seeing through arguments, finding weaknesses in arguments, taking issue with positions, uncovering bias, acknowledging value positions and in sum reasoning" (Alexander, 2010:214). There is, therefore, the important and cross-cutting assumption that all discourse is imbued with power in some way. Notwithstanding the idiosyncrasies to which Alexander refers, I subscribe to the idea that uncovering the relations of power in the products of IA, however arbitrary this may appear to some, can add value for the discipline. The important

point to make is that none of the observations offered are intended to discredit the authors of the IA reports or the scientists involved. As I have also stressed in parts of the thesis, my purpose is also not to undermine the utility of IA. The interpretation I offer serves to both highlight competing perspectives of risk, and to stress that the assessment process itself is an essentially human activity.

The theoretical lens for each discourse study in the following chapters are important for the bounds they impose on the critique, also ensuring that my observations are grounded in established socio-cultural research practices. I have, in some measure, tried to distance myself from the establishment of IA and permit the theories, that are novel in this field, to lead me to alternative and discomfiting meanings I (and others in the field) may ordinarily have overlooked. That said, I also take to heart MacIntyre's (1984) observation that "I can only answer the question 'What am I to do? ' if I can answer the prior question 'Of what story or stories do I find myself a part?'" (MacIntyre, 1984 cited in Flyvberg, 2006:240)

Finally, irrespective of its function to contribute to more equal relations in communication processes, discourse analysis is affected by a paradox inherent in the social constructivist research tradition - that the researcher's findings and conclusions are also a discursively produced and contestable version of 'truth'. In this regard, my approach, particularly the descriptive dimension of the discourse, is aligned to the post-structural tradition within constructionism, whereby texts lead to different and multiple interpretations. As explained by Khan and MacEachen (2021:4) meanings of texts are, therefore, diffused rather than fixed or settled, and there is "no absolute interpretation or truth" - textuality always provides a surplus of possibilities.

Bearing these complex ethical dilemmas in mind, I do not offer my analyses as anything approaching a fully comprehension or complete understanding of competing constructions of risk for IA, but rather as a stepping-stone towards a better understanding of what constitutes competing constructions and what their possible implications are for the South African IA discipline.

**Referencing and presentation**

In this thesis I use the Harvard referencing system, aided by the Mendeley reference manager application for scholarly citations and other sources (including websites and newspapers). The referencing protocols for the verbatim material that I derive from the IA reports, court cases, surveys and the interviews is described in Table 5 below.

In respect of the presentation of the material, I have distinguished between quotes from the surveys/interviews, scholarly citations and textual extracts as follows:

- Underlined upright text for extracts from IA reports and associated documentation (unless tabulated)
- Grey upright text for extracts from survey and interview transcripts
- *Italicised normal text for legal, academic, and other citations*

I have used footnotes in a few instances where I have included supplementary information which is of interest, but not part of the discourse analysis itself.

Table 5: Referencing protocols

| Source | Citation | Examples |
|---|---|---|
| IA reports for the specialist study, the EIA and SEA. | Each report is cited according to it being the specialist study (SS), the environmental impact report (EIA) or the strategic environmental assessment (SEA). This is followed by the report reference, the report date and page number for the extract in italics. | (SS:0305334:07.2015:*pg*)<br>(EIA:12/12/20/944: 02.2016:*pg*)<br>(SEA:978-0-7988-5631-7:11.2016:*pg*) |
| Comment and Response Report for the Nuclear Power Station case study | The Comments and Response Report component of the EIA for the Nuclear case study comprises three volumes. I have, therefore, included a Volume number (1, 2 or 3) in the citations between the report reference and date. | (EIA:12/12/20/944:<br>V1/2/3:02.2016:*pg*) |
| Survey respondents | Each survey respondent (SR) is cited in brackets as SR 1, SR 2, SR3 etc. followed by the date of receipt of the survey response. | (SR 1:12.03.2021) |
| Interviewees | Each interviewee is cited in brackets as either IR 1 or IR 2, followed by the date of the interview. | (IR 1:15.03.2021) |

| Source | Citation | Examples |
|---|---|---|
| Court judgements, primary and delegated legislation | These are cited in the text or in footnotes to the text in accordance with the house style of the South African Legal Journal | N/A |

## Conclusion

In describing my specific methods in this chapter, I am mindful that these are intertwined with the concepts and theories presented in previous sections. As mentioned in the Introduction to the thesis, and reinforced by several scholars cited in this chapter, theory and method or inseparable in the application of discourse analysis. Hence, this methodology chapter is preceded by detailed structuring of my conceptual approach and theoretical framework. These underpin the discourse analysis ensuring that the methods are not mobilised overly arbitrarily. As explained in this chapter, although application of a linguistically orientated CDA is novel in IA research, there are several precedents for applying a Foucauldian lens to debates and disputes which provide useful guidance and points of comparison.

What I have also highlighted in this chapter is the inherent bias that accompanies the critical approach to the analyses. This bias is evident in the provocative quality of the case studies that follow. In the Foucauldian tradition, I interrogate conventional language, symbols and behaviours, irrespective of whether there is intention and agency behind choices in this regard, or if habits are perpetuated in a non-circumspect manner. The methods described are thus applied in separating and examining the multiple threads of discourse which shape, or construct, risk in the respective case studies.

# Chapter 6

# Case study: Specialist study for a bulk fuel storage facility in Cape Town Harbour

In this case study I apply discourse analysis to an example of a specialist study forming part of an IA for a bulk fuel storage depot at Cape Town Harbour. In respect of my third research questions, the purpose of this chapter is to mobilise the lens of Ulrich Beck's risk society theory and explore its implications for stakeholder values and power dynamics. I begin with a brief outline of the role of the specialist study in IA, followed by an explanation of the project in its social and geographic context, before homing in on the descriptive, interpretive and explanatory dimensions of the case. My findings highlight how a realist interpretation of risk, embodied by the specialist study, is integral in a hierarchical scheme for risk management, that enables a sharing, or distributing risk across communities. Accordingly, the risk analysis stands for characteristics of the risk society and reflexive modernity, in its professionalised and institutionalised approach to risk and hazard management.

## The specialist study

Specialist studies form the basic building blocks of impact assessment. According to the South African Department of Environmental Affair's (DEAT) guideline for specialist studies, these are commissioned "to provide the information necessary to respond to the key issues associated with the proposed projects" (DEAT, 2002b:5). The focus of specialist studies is on the interface between the proposed project and specific attributes of the potentially affected social or biophysical environment. As explained in the guideline, the task of the specialist is to "analyse the current situation and assess the various impacts in terms of their anticipated magnitude" (DEAT, 2002b:5).

The couching of specialist studies within either EIA or SEA reflects a persistent inclination of mainstream science to break down complex phenomena into tractable

and parsimonious research components (Herrick & Sarewitz, 2000). Ideally, these should each contribute to an overall interdisciplinary assessment of the merits and drawbacks of a proposal. Notwithstanding the principle of integration, specialist studies are, in themselves, discipline specific. The experts who are commissioned to undertake these studies employ discipline-aligned concepts, models and paradigms which focus on a delimited range of phenomena or period of time (Lawrence, 1997). Given these characteristics, it is not unusual in the South African context for a specialist study to form the basis for decisions rooted in specific regulations, as well as the more generally applicable and cross-cutting legislative requirement for IA. As Sandham and colleagues (2010) point out, IA is frequently conducted in conjunction with other permitting studies[8] but under a broader mandate to consult public stakeholders, and ensure adherence to the principles in the National Environmental Management Act (107 of 1998).

In the South African system for IA, decisions about the need for and type of specialist studies falls mainly to the discretion of the EAP. Direction is, however, provided in permitting requirements, lists and protocols included in the guidelines issued by the authorities, and mentioned above. Judgements about the scope and level of detail required should also be based on the issues and concerns identified by stakeholders during the scoping stage of the IA. That said, in my experience, EAPs often anticipate the more likely specialist studies and draw on the outcomes of stakeholder engagement to confirm their judgements.

Depending on the size of the project and sensitivity of the affected environment, there may be just one or two, or dozens of specialist studies. These typically range across various branches of ecology, economics, aesthetics, heritage, sociology, archaeology, geophysics and seismicity, ground- and surface water, health and safety, toxicology, atmospheric science, marine science, or any other feature of the environment that may be affected by the proposal.

[8] For example hazardous installations, heritage, water use, biological control agents, genetically modified organisms, product labelling, alien vegetation, hunting of wildlife, and so forth.

Apropos the topic of my research, the specialist study subject to analysis in this chapter is an expert health and safety study (or risk assessment), for a bulk fuel storage facility at Cape Town Harbour. In discourse analysis terms the specialist study is the 'order of discourse' to which constructions of risk relate.

## Background to the project

Over the last few years South Africa's electricity crises has increased the demand for liquid fuels, particularly diesel to supply emergency generators, due to the frequent breakdowns at the country's coal fired power stations. In 2017 it was reported that demand for diesel has surpassed domestic supply capacity, causing an upsurge of diesel imports, with an average growth rate of 10% per year between 2007 and 2016 (Ratshomo & Nembahe, 2017). Notwithstanding the upswing in demand, the need for the supply of liquid fuels, and storage capacity for this component of the country's energy requirements has long been a priority for the South African government (Nkomo, 2009). This resolve is underpinned by a Petroleum and Liquid Fuels Sector Transformation Charter (Schedule 1 to the Petroleum Products Act, 120 of 1977), which recognises that the structure of the liquid fuels sectors in South Africa still has roots in the apartheid era. Prior to 1994, sanctions imposed on the country compelled a protected economic environment where a small number of oil companies were allowed to grow, acquire key infrastructure, including refineries and depots in strategic locations, and thereby develop market power. This led to vertical integration across all levels in the fuel sector, from importing, refining and production to distribution and retail (Paelo et al., 2017). The industry consequently remains dominated by seven oil 'majors' – Total, Sasol, Engen, Chevron, Shell, PetroSA and BP. These operators account for about 70% of the retail volumes of fuel sold (Lewies, 2013). Given the location of their refineries and control of the port and storage facilities, they have also historically controlled the upstream supply of fuel (Paelo et al., 2017).

From a governance perspective, the liquids fuels sector is jointly administered by South Africa's Department of Energy (DoE), and the National Energy Regulator of South Africa (NERSA). Whilst the DoE deals with issues pertaining to licensing and

the general fuel pricing structure, NERSA governs petroleum pipeline operations and approves tariffs for storage and loading facilities. The Petroleum Pipelines Act (No. 60 of 2003), in terms of section 20(1)(n), gives NERSA the authority to compel operators of pipelines, loading and storage facilities to allow independents access to unused or 'uncommitted' capacity.

Against this backdrop, a proposal for a new fuel storage facility was submitted to NERSA by an independent company called Burgan Oil, which in 2008 formed a subsidiary called Burgan Cape Terminals (Pty) Ltd. The subsidiary is 70% owned by Burgan (a large Netherlands-based terminal operator), whilst the remaining 30% is split between two South African black economic empowerment entities. The project, valued at about R650 million, is aimed at addressing the "lack of domestic fuel storage capacity in South Africa, and to improve the security of fuel supply" (Chambers, 2017:n.p.). Alongside these drivers, the fuel storage project also falls within the ambit of government's 'Operation Phakisa', launched in 2014. 'Phakisa' means 'hurry up' in Sesotho and the programme is a cross-sectoral initiative aimed at developing and expediting projects intended to boost economic expansion in terms of the country's National Development Programme (Findlay, 2018). From a legislative perspective the Operation is facilitated by the Infrastructure Development Act (23 of 2014), especially targeted at expediting licencing requirements (including environmental authorisation) for Strategic Infrastructure Projects (SIPs), thereby prioritising their planning approval and implementation (Day, 2015).

The operating model for the Burgan fuel storage terminal is one by which oil companies, including two large 'anchor tenants' rent space at the facility to store their fuel products prior to distribution to customers. The throughput of fuels at the newly built facility is approximately 805 000 $m^3$/year (Cloete, 2015). Located on the eastern mole of the Port of Cape Town, the fuel products are delivered by ship or road tanker. The fuel is then transferred from designated loading bays into one of twelve bulk storage tanks where it is stored before being redistributed to customers. The products stored in the tanks are fossil fuels, including petrol and diesel of various grades, and additives such as ethanol and FAME (a bio-diesel additive). The tanks range in capacity from about 1 800$m^3$ to just under 15 000$m^3$. Owing to the presence of an

existing facility on the berth, the tanks are split between two operating areas connected via above-ground product pipelines. The existing installation, forcing this arrangement of the tanks, is a bulk heavy oil storage terminal, already classified by the DoE as a Major Hazard[9].

The IA undertaken for the bulk fuel storage depot in 2015-2016, is required in terms of the EIA Regulations [10], it being "listed" in Schedule 2 of 2014 as:

*"development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres".*

The specialist report, titled Major Hazard Installation Risk Assessment, is one of seven specialist studies included in the EIA (SS:0305334: 07.2015).

The appropriateness of the risk society theory in respect of this case is demonstrated by the characteristics by which Beck defines technological risks (as explained in Chapter 4), several of which are demonstrated by the production and bulk storage of fuels, as summarised in Table 7.

Table 6: Parallels between characteristics of postmodern risks and bulk storage of fuel

| **Risk characteristics according to risk society theory** | **Bulk storage of fuel in an urban area** |
|---|---|
| Absence of individual choice: negative consequences of pollution and hazards are borne by a discrete few, enabling the general populas to benefit from a contemporary lifestyle. | Convenient availability of fuel to power motor vehicles, generators, industrial processes and so forth. |
| Invisible and insidious nature of dangers that are imperceptible to actors without access to specialised equipment. | The potential formation of a gaseous cloud that could drift off-site, depending on weather conditions, undetected by human perceptive abilities and forcing reliance on gauges, monitors and alarms to signify potential danger. |

[9] Classification by the Department of Labour, according to the Major Hazard Installation Regulations (GNR 692 in *GG* 22506 of 30 July 2001) of the Occupational Health and Safety Act (OHSA) 85 of 1993.
[10] GN R982 in *GG* 38282 (8 December 2014)

| Risk characteristics according to risk society theory | Bulk storage of fuel in an urban area |
|---|---|
| The imperative to avoid potential harm altogether is replaced with the notion of equitable distribution, facilitated by the scientific concept of "acceptable levels". | Despite being declared a major hazard, the system does not disallow the facility, but rather requires it to be identified and registered on the government's 'invisible' MHI database. |

## Discourse analysis

In this case study I 'enter' the discourse analysis via the descriptive dimension of Fairclough's model of CDA, focusing on the text in the specialist report that informs the recommendations in the IA. I follow this with a discussion of the interpretive dimension, referring to the institutional structures in which the study is embedded. In the final part of the analysis, I consider the wider explanatory dimension comprising the political, social and economic context for the study.

### Describing risk: Assumptions and science speak

*A realist definition of risk*

In terms of the risk continuum, the discourse in the specialist study report is representative of the realist end of the spectrum described in Chapter 4. The risk posed by the facility is, accordingly, calculated by "by multiplying the *frequency* of the release by the *probability* of the various outcomes" (SS:0305334:07.2015:*9,* emphasis added). Corresponding to this definition, risk is presented in terms of "accident scenarios" (SS:0305334:07.2015:*9*). These include the catastrophic or partial failure of a bulk storage tank, leading to either a flash fire or explosion; and the leak or failure of a pipeline or hose during the off-loading and transfer of fuel to the bulk tanks, leading to a pool fire. In assessing the scenarios, the specialists rely on calculative methods, using Boolean algebra and a bespoke computer model. The annexures to the specialist report, containing the results of the Consequence Modelling, comprise 70 pages of numerical outputs. These results are used to "make judgements, either through relative risk ranking or risk reduction strategies, or through comparison with

established risk targets" (SS:0305334:07.2015:*11*). The "established targets" are what Ulrich Beck refers to as "acceptable levels" in his risk society theory (Beck, 1992:46).

My suggestion in Chapter 2, that the definition of risk for IA has been influenced by that of expert risk assessors, alludes to the interpretation exemplified in the specialist study. Evidence is provided by the responses received to the question about how risk is defined in EIA, in the survey of EAPs. All but one practitioner (who answered that risk is defined in confusing ways) indicated that their understanding of risk is aligned to the realist interpretation:

> Risk is defined as a combination of consequences and probability (SR2:03.03.2021)
>
> In EIA we typically use risk language when assessing unplanned event…many of the unplanned events which are assessed (an oil spill for example) has very high consequences combined with a very low probability (SR1.12.03.2021)
>
> I am seeing more and more EIAs categorise risks based on the likelihood of occurrence and significance of consequences which I think is a good way to frame the findings (SR4:02.03.2021).
>
> Risk is not defined in the Regulations governing impact assessment in SA, but used interchangeably or together with the term impact. In my opinion, risk is rather related to the probability of an impact occurring, which is generally used to determine its significance (SR5:02.03.2020).
>
> I would assume that risk within the EIA field would entail the assessment of the likelihood of adverse ecological effects to occur as a result of an action. I think there are many overlapping basic principles between generic EIA processes and Risk Assessment processes (SR6:17.03.2020).
>
> Risk is the magnitude or severity of a consequence (impact) and the probability (likelihood) of its occurrence, and it is usually evaluated using a matrix (SR7:17.03.2021).
>
> To incorporate risk one needs to define it in terms of probability of the event, and the consequences. The former is risk and the latter is impact (SR8:01.04.2021).

In an indicative summation of these perspectives from the survey, the two interviewees' responses were as follows:

> ...risk actually forms the basis of how I would venture most people do impact significance, and certainly what the authorities expect. So it is always a variation of consequence and probability (IR1:15.03.2021).

> Generally in South Africa risk is assumed to be impact or significance determination where impact or significance is likelihood times severity, or probability times consequence, or likelihood times consequence – more or less all the same thing (IR2:19.03.2021).

This list of definitions provided by the survey participants and interviews for this research confirm the finding of my literature review relating to the prevailing realist interpretation of risk. This definition is, arguably, particularly customary and expected in the context of a health and safety specialist study like the one under discussion in this chapter.

*Skill in numbers*

To begin their report, the authors describe the rationale for the risk assessment. The opening paragraph refers to the dangers of fuel storage, explaining how "a series of major accidents at fuel storage, handling and production facilities have focused worldwide attention on the need to control the design and management of facilities where potential for major accidents exists" (SS:0305334:07.2015:*1*).[11] Taken at face value, this introduction appears to justify a level of public anxiety about bulk fuel storage and handling facilities. However, reading against the text, this sentence also points to the specialists' view of the solution to the problem – the need to "control the design and management" of the sources of risk. Linked to this imperative, are the required certifications for the expert analysts. In this case, the specialists had to be approved by the South African National Accreditation System (SANAS) and the Department of Labour's (DoL) Approved Inspection Authority (AIA). Proof of

[11] As I am citing this extract, a report is coming via the news channels about the explosion caused by a fuel tanker in Sierra Leone which at the time of writing has killed 98 people.

qualifications, appended to their report, signifies the analysts' competence to deliver expert and objective judgements of risks posed by the storage facility, and how these should be controlled[12].

Much of the work of the risk analyst is done remotely, as experts draw on established principles and guides. As explained in Chapter 2, many of these have their roots in seminal policies such the US Red Book (Risk Assessment in the Federal Government: Managing the Process). In South Africa, the Department responsible for Environmental Affairs has issued a general guide for risk management as part of its Integrated Environmental Management series of guidelines. Accordingly risk management "fosters the concept of reducing risk to an acceptable level on an ongoing and continual risk improvement basis, as advocated by management system standards for environmental management (ISO 14001), quality (ISO 9000) and health and safety management (OHSAS 18000)" (DEAT, 2006:3). Also explained in the Guideline is how the scientific approach employs quantitative modelling, and that assessors should be trained to deal with the complex mathematical formulae to determine hazards, total risk calculations and incident, dispersion and explosion modelling (DEAT, 2006).

Many standard defaults (assumptions and adjustments) are written into software models, such that the specialists job includes gathering and adapting data to cater to site-specific situations. The data is then tied together with the predictive computer models; and the results of the modelling are submitted to the regulator. The authorities will look to the calculations as indicative of expertise and professionalism, even though, as Spiegelhalter (2017:50) points out, the use of scientific notation "seems almost designed to prevent general comprehension". One of the interviewees for this research relates his experience in this regard:

[12] This characteristic of the specialist study is reflective of governmentality theory – the governance of conduct. Although I do not apply this theory, it is commonly referred in the scholarship focusing on alternative interpretations of risk (see Table 1 in Chapter 3). In the EIA literature, Cashmore and colleagues (2015) have used a governmentality lens in an analysis of guidance for environmental practitioners, as an instrument of power.

> … in some instances the authorities even say, well, your numbers, you know, it's like why haven't you done these calculations? Again and again? It's because there's nothing else offered, in my view. There's nothing that works as an adequate form, as an adequate replacement for that. And people don't know any better. So they use that. (IR1:15.03.2021)

Given these circumstances, arguably, the specialists' primary goal is to ensure the numbers are as accurate as possible. This in itself is not an easy task, given that correctness of the numbers is inevitably affected by location-specific factors over which the specialists have no direct influence. Fischhoff (2012:211) explains how, notwithstanding the value of technical skills for risk analysis, there are always pitfalls that come from translating an applied technology into "a scientific pursuit".

*Compensating for uncertainty*

Any expert becomes accustomed to the limitations of their tools, and how they may need to compensate for deficiencies. The EIA Regulations in South Africa require "a description of any assumptions, uncertainties, gaps in knowledge which relate to the assessment and mitigation measures proposed".[13] This leads to what Duncan (2013) calls a "disclosure remedy" – a necessary recourse for specialist studies in "the predictive model context in which IA is now embedded" (Duncan, 2013:151). Assumptions are relied on to reduce complex systems into "simple models or representations of reality" (DEAT, 2002a:6). Disclosures ought to explain the implications of such assumptions.

One respondent in the survey of EAPs refers to this process of simplification as "a standardised way (making the comparison of apples and pears possible) and weighing them up or aggregating them to come to a conclusion" (SR8:17.03.2021).

As in the case of most specialist studies the risk assessment for the fuel storage depot, rests on an array of assumptions or defaults. These occur throughout the report, such that it is difficult to appreciate their combined effect. Not unusually, the assumptions are omitted from the high-level summary of the report as well as from the translation

[13] Section 3(1)(o) in Government Notice 326 in *GG* 40772 of 7 April 2017.

of findings in the overall EIA report. In this respect environmental lawyer, David Morris, in his opening address at the 2019 IAIA Conferences points to how limitations tend to be found "buried within thousands of pages, and are certainly not drawn to one's attention in the Executive Summary" (Morris, 2019:n.p.). It is likely, therefore, that disclaimers are included in fulfillment of codes of practice and regulatory requirements, but excluded from information that is accessible, and prioritised for the benefit of the public stakeholders. Alexander (2010:24) uses the term "discourse engineering" to refer rhetorical means by which the attention is deflected from those aspects which could undermine the authority of the study.

Fulfilling the discourse analyst's role to uncover what may ordinarily be taken for granted, I have compiled a list of assumptions and limitations, extracted from the specialist report, in Table 6. I have highlighted 'hedging' words, which are words used to mark some expression as possibly not quite adequate (Brown & Levinson, 1987). Revealed in this compilation are the conventions that are customary in EIA, but which, through the lens of risk society theory, could also be seen to reflect the "optimistic futility" of attempting to anticipate what cannot be anticipated (Beck, 2006:329). Examples of assumptions (included in Table 6) are a reliance on weather data compiled 40 years prior, because that is all that is available (see no. 8 on the list); a reference for personnel failure rates that has not been updated for 23 years (no. 21 on the list); the lack of an appropriate and validated simulation tool to predict overpressures, despite precedents of fuel storage tank explosions in the United Kingdom and Puerto Rico (no. 2 on the list). Indicated in item no. 19, on page 44 of the report, is an acknowledgement that, all things considered, the assessment is a "best estimate".

Table 7: List of assumptions and disclosures in the specialist study (hedging words in bold)

| No. | Pg. | Assumptions and disclosures |
|---|---|---|
| 1 | 2 | All equipment at the terminal will be designed, constructed, operated and maintained to world class standards and will comply with all relevant South African legislation" (this assumption is repeated three times in the report) |
| 2 | 3 | There is no validated simulation tool that is available to predict overpressures in events similar to previous explosions in the United Kingdom and Puerto Rico |

| No. | Pg. | Assumptions and disclosures |
|---|---|---|
| 3 | 4 | The site investigation undertaken prior to the compilation of the report was **solely for** the purpose of gathering information and not for "judging the adequacy of the design, operation, or maintenance of the site |
| 4 | 7 | The study is **only** concerned with major incident hazards as defined by the scope of the South African Major Hazard Installation Regulations" relevant to incidents which involve dangerous substances that give rise to off-site risk relevant to the general public and other industries |
| 5 | 9 | The likelihood of potential hazards following failure of tanks, vessels, process piping valves, flanges etc. is estimated from a copy of the Planning Case Assessment Guide (PCAG) developed by the UK Health and Safety Executive (HSE). The frequency of the various outcomes is then estimated by multiplying the frequency of the release by the probability of the various outcomes – **principally** pool fires and flammable vapour clouds of various sizes |
| 6 | 10 | Complex shapes illustrating the footprint of the consequence are "**simplified** to regular shapes in order to calculate the angle of entrapment" |
| 7 | 14 | The **preferred** stability classification scheme for use in air quality modelling applications is the scheme proposed by Pasquill (1961) |
| 8 | 14 | Since no site-specific weather data were available, meteorological data (i.e. wind and stability data) from the closest weather station, Cape Town Airport, was sourced from the research report 'Stability Wind Roses for Southern Africa' (1979) |
| 9 | 15 | It is **assumed** that all personnel will be trained and equipped to carry out the requirements of their position within the organization and will be declared competent to fulfill their duties such that the organization in place at the site is expected to be commensurate with the level of risk posed by the installations under assessment |
| 10 | 18 | All tank management will be undertaken to world class standards and will comply with all relevant South African legislation |
| 11 | 18 | All storage tanks will be provided with secondary containment that will be able to contain leaks and spills |
| 12 | 18 | All bunds will comply with SANS 10089-1 and that bund sizes and capacities **will be** appropriate according to the standard |
| 13 | 19 | The site will comply with the requirements of the Transnet Ports Authority (TPA) and world class best practices and standards such as those published by NFPA, SANS & API |
| 14 | 20 | **If** an alternative make/model emergency water sprinkler is used, the cooling water application rate **would need to be revised** to meet the requirements of the nozzle and could change the quantity of nozzles required |
| 15 | 26 | Due to kerbs, slopes, drains and other obstacles, pool fire areas and directions can be **unpredictable**. To provide a conservative model, pool fires are modelled as perfect circles |
| 16 | 29 | The vulnerability of people exposed to thermal radiation **depends** on the intensity of the incident radiation and the duration of exposure |

| No. | Pg. | Assumptions and disclosures |
|---|---|---|
| 17 | 30 | It is **assumed** that the maximum exposure time is 30 seconds "allowing for the exposed persons to escape or find shelter" |
| 18 | 42 | For pool fire purposes it is **assumed** that 50% of the tank contents overtops the bund |
| 19 | 44 | Contours for overpressure zones are based on empirical data from the Buncefield incident and **may vary** from site to site, depending on topography, filling rate, congestion within the vapour cloud and weather conditions. The assessment is a "**best estimate**" |
| 20 | 47 | Tanker loading facilities are **assumed** to occur in a drained and partially enclosed area, and connection failures and **assumed** to result is a pool confined only by the low pavement area |
| 21 | 54 | Human factor failure frequencies are **dependent** on the complexity of a task and level of stress experienced by an operator required to perform a task. Failure rates of personnel are taken from the TNO Red Book (1997) |
| 22 | 55 | It is **assumed** that operators will be present during offloading and in constant communication with the ship but conservatively assumed that "breaks in communication can occur and, therefore a large cloud has been assumed can occur in the event of overfilling" |

In risk society theory, "the disclosure remedy" can be seen as a rhetoric device to impose order on a changeable and unpredictable situation - as Beck (1992:156) points out, the analytical science of risk is in a persistent battle against reflexivity as it attempts to overcome its own weaknesses. In this respect, he refers to speculations and provisos made by risk analysts as a "house of cards" that "moves exclusively within a framework of *probability statements*, whose prognoses of safety cannot be refuted" (Beck, 1992:29, emphasis in the original). A self-prescribed solution in the context of the risk society is the "staging and perfecting of a cosmetic treatment of risk" (Beck, 1995:84), so that "the lamented 'worst case scenario' proves to be a highly successful policy of absorption" (Beck, 1995:63). It is apparent that this policy relies on a particular form of nominalized language by which situations are presumed to occur in the absence of human agency (see number 10 – 13 in Table 6) – for example, "the site will comply"; "tank management will be undertaken"; "all bunds will comply"; "the study is only concerned". This type of passivation is a hallmark of the professionalisation of risk: a rhetorical exercise in absolution. The study is done, the numbers are presented in a categorical manner, and whatever occurs subsequently

simply happens: “no specific individual can be shown to have created this set of structures” (Alexander, 2018:201).

*A hypothetical victim*

The disclosures and assumptions do not only pertain to technical inputs to the risk formula, the consequence component of the equation is also affected. Human characteristics and human behaviour are based on ‘typical’ characteristics. For example, a maximum exposure time of 30 seconds is stipulated, assuming this is sufficient “for the exposed persons to escape or find shelter” (SS:0305334:07.2015:*30*). The “individual risk fatality criteria” is based on a “hypothetical” person (with ascribed qualities and behaviour patterns) (SS:0305334:07.2015:*38*). The “societal risk criteria”, which is a measure of society’s aversion to accidents with multiple fatalities and/or injuries, is based on criteria set by the United Kingdom’s Health and Safety Executive (SS:0305334:07.2015:*39*). The criteria are categorised into different levels of “risk tolerability” by which there is no distinction between South African society or British society. Everyone is equally able-bodied, equally wealthy, equally cultured, equally healthy, equally educated and all the same gender. Similar assumptions apply in respect of on-site operators whose propensity for individual fallibility are averaged in a “TNO red book” published in 1997 (see no. 21 in Table 6). This approach to risk modelling is explained by Beck as one that ensures “human beings are in the picture, only as organic material” (Beck, 1992:24).

Relevant to these assumptions is one of the responses to my survey questions about challenges and opportunities associated with risk definitions:

> *It is not always easy to quantify things so simply especially when dealing with complex social issues, perhaps it is easier to apply to environmental or health and safety consequences than to social consequences.* (SR7:17.03.2021)

In her article entitled *Technologies of Humility*, Jasanoff (2007) describes how computer simulations and their parameters have become normalised in the practice of risk analysis. Such technologies become vehicles for a technoscientific discourse - illustrating how these types of depictions tend to “impose limits on what gives

meaning" (Jørgensen & Phillips, 2002:13). Irrespective of the implications, the numbers are crunched and the result is passed from the specialist report to the IA, via the stakeholder engagement process and on to the decision-maker. Through this process the link between the output and fundamental uncertainties and contingencies is gradually all but undone (Duncan, 2013). In this regard one of the interviewees for this research makes reference to "some magic number which pops out at the end of (an) equation and its fits with some characterisation…then the impact is significant or not significant or whatever it might be" (IR1.15.03.2021). According to this interviewee many scientists and EAPs have come to accept "a kind of dishonesty inherent in a system that encourages the scientific method".

Every so often there may be scientifically inclined stakeholders who pose questions in respect of assumptions and disclaimers in risk assessments, but in my experience it is very seldom that the analytics are interrogated. One the EAPs interviewed about their interpretation of risk, comments in this regard as follows:

> *So basically impact assessments are very poor at giving IAPs*[14] *the opportunity to articulate their values or their perception of risk… IA is a one-way communication of risk, or a one communication of significance.* (IR2:19.03.2021).

A respondent to my survey opines that "model outputs typically showing the consequence gives a skewed view to a stakeholder who does not understand risk" (SR1:12.03.2021). This respondent goes on to say that "the EAP who also does not understand risk assessment cannot effectively respond to questions" (SR1:12.03.2021). Contributing to this problem is what Horlick-Jones (1998:83) has referred to the "empiricist repertoire".

*An "empiricist repertoire"*

A component of the "cosmetic treatment" of risk which Beck describes, is the scientific vernacular that is customary in risk assessment. Horlick-Jones (1998) describes the formal language used to explain findings "as arising unequivocally from experimental

[14] Interested and affected parties

data, gathered according to impersonal rules" (Horlick-Jones, 1998:83). According to Alexander (2018:198), this can result in a "twisted knot of distortion", which discourse analysts have an obligation to untie. Indicative of this problem is one of my interviewee's observations – "that risk is very much defined by natural scientists, modellers and quantitative risk assessors, and social science theories are left out of this equation" (IR2:19.03.2021).

In Section 2 of the risk analysis for the bulk fuel storage facility, key concepts are defined, including "hazard" and "major hazard". The latter, according to the UK Institution of Chemical Engineers, is "an *imprecise* term for a large-scale chemical hazard *especially* one which may be realised through an acute event" (SS:035334:07.2015:5, emphasis added). The associated definition of a "major hazard installation" is taken from the South African Major Hazard Installation Regulations: "an installation where any substance is produced, processed, used, handled or stored in such a form and quantity that it has the *potential* to cause a major incident" (SS:035334:07.2015:5, emphasis added). The process of hazard identification is described by the UK Institute as "the identification of *undesired* events followed by an analysis of the mechanisms by which *undesired* events could occur" (SS:035334:07.2015:5, emphasis added).

Despite connotations of accuracy, reinforced by extensive appendices of calculations, the words that I have italicized in these definitions are further examples of hedging words, similar to those highlighted in Table 6. These words show up the difficulties of using a scientific vernacular to describe potential harm and suffering, without recourse to values. On page 7 of the specialist report a "harm criteria" is outlined as follows:

> During the analysis it is necessary to define harm criteria (or 'end points') for use with the consequence models. In the case of this study, these harm criteria are levels of thermal radiation intensity and where relevant, overpressure (in the case of vapour cloud explosions) (SS:0305334:07.2015:7).

It is clear from this description that the object of value, which I refer to in Chapter 3 as diagnostic of risk, has become implicit - effectively masked by the technical terms

"thermal radiation intensity" and "overpressure". Potential for harm is framed as a side effect that is secondary to a primary notion of benefit: an assessment for requisite bulk storage of fuels, to meet consumer demand and provide economic stimulus. Correspondingly, the risk analysis relies on "acceptability according to ALARP" (as low as reasonably practicable). ALARP is defined in the specialist report as "the risk when the cost of any further risk reduction measures would be grossly disproportionate to (i.e. much greater than) the benefits gained" (SS:035334:07.2015:*38*)**.** Accordingly, the results of the analysis are summed up in the EIA as follows:

> The societal risk profile…is considered to be broadly acceptable. The individual risks are considered to not be intolerable but only tolerable if proved to be ALARP for members of the public. Burgan must show that actions have been taken to ensure the levels of risk are ALARP for members of the public (EIA:0142769:06.2015:8-59).

This finding exemplifies what Norton (2005:42) refers to as exclusionary disciplinary discourse (in-group jargon) - language that "cuts people off from criticism and suggestions that are motivated by different viewpoints and interests". Any would be plural meanings for risk is translated via the scientific vernacular into "restricted, one-dimensional terms" (Wynne, 2002:461). In response to my survey of EAPs, one participant refers to the definition of risk in IA as adding "to the confusing verbiage that is often used in legal EIA processes – which earns the profession a bad name". In answer to the question about whether the interpretation of risk for IA has changed over time, the same respondent replies: "WELL NOT IF ONE SPEAKS PLAIN ENGLISH" (SR3:02.03. 2021, caps in the original).

Whilst this discourse may be apropos the specialist arena of risk assessment, it becomes problematic when the language tends to obfuscate rather than clarify the risks. What is clear in this analysis of the descriptive dimension is how little room the scientific formulation leaves for co-production of knowledge, in which stakeholders can contribute to understanding the contingencies inherent in the expert claims. As Alexander points out, the technocratic and bureaucratic naturalization of discourse is so routine that people feel helpless and "inextricably caught up in structures too big for them" (Alexander, 2018:201). In this respect, Horlick-Jones (1998:83) is critical of

"rhetorical appeals to idealistic notions of objectivity and truth" which "deny the inherent ambiguity and value-loaded nature of risk". The interpretative dimension of the analysis is indicative of these layers of complexity and permutations in the meaning of risk, as it pertains to this example.

**Interpreting risk: Major hazards and gesture politics**

The social phenomenon of risk advocated in Beck's risk society theory is apparent beyond the text in the specialist study and IA report. In this respect the interpretive dimension of CDA encourages exploration of the administrative mechanisms and political structures by which the realist interpretation of risk is propagated in society more generally.

In risk society theory Beck uses the term "relations of definition" in conjunction with "organised responsibility" to pronounce on the panoply of institutions and agencies involved in the uncovering and management of risks (Beck, 2006; Wales & Mythen, 2002). In the risk society, these are the "rules, institutions and capacities that structure the identification and assessment of risks; they are the legal, epistemological and cultural matrix in which risk politics is conducted" (Beck, 1998:18).

The specialist study for the fuel storage depot is presented precisely according to the applicable risk governance scheme. On page 4, the report lists the regulatory requirements and the corresponding sections of the report in which the requirement is met. The report states that the site of the proposed fuel storage depot "will comply with the requirements of the Transnet Ports Authority (TPA) and world class best practices and standards such as those published by NFPA, SANS and API" [15] (SS:0305334:07.2015:4). The resultant recommendations speak directly to the system by which risks are institutionally managed and distributed (SS:0305334:07.2015):

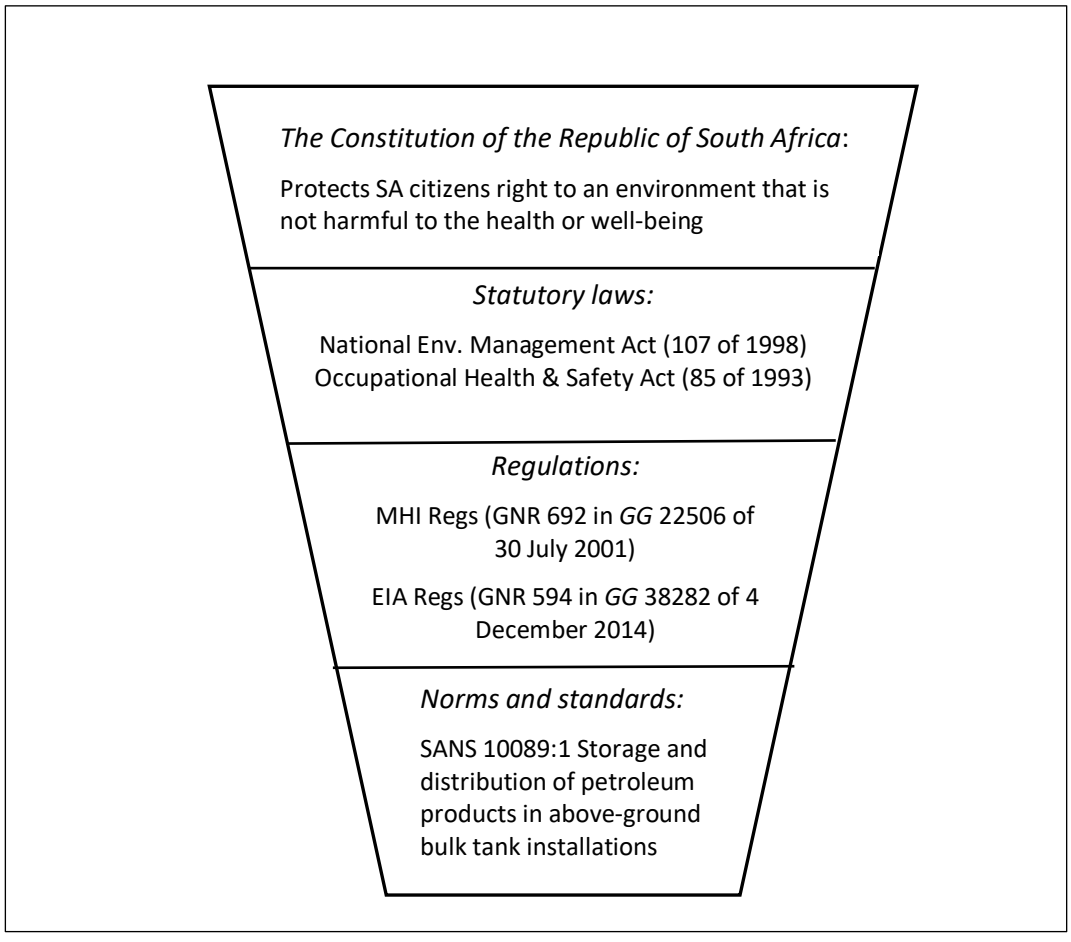
- The installation will qualify as a "Major Hazard Installation" (MHI) in terms of the relevant regulations administered by the Department of Labour

[15] These acronyms are not spelt out in the report but presumably stand for the National Fire Protection Association (NFPA); the South African National Standards (SANS) and the American Petroleum Institute (API).

- As a result of being declared an MHI, the requirements of the MHI Regulations must be followed to ensure that the installation is legally compliant
- Copies of the risk assessment will be submitted to the Local Provincial Director of the Department of Labour, the Chief Inspector of the Department of Labour Head Office and the Local Authorities
- The risk assessment will be reviewed by an Approved Inspection Authority (AIA), at intervals not exceeding five years.

These requirements reflect the tiered regime which governs how risks associated with fuel storage, are dealt with in South Africa from an environmental management perspective (see Figure 8). In addition to this regime, there are the requirements of the DoE and NERSA, as explained in the background to the project.

Figure 8: Legislative requirements relevant to potentially harmful installations



The result of the MHI declaration, is the addition of the fuel storage depot to a list of MHIs administered by the Department of Labour (DoL). The database is not publicly available, so it not known - other than to the authorities - how many MHIs exist and how they are arranged in relation to one another and affected communities. What is evident in this arrangement is the 'protective barrier' provided by the "relations of definition" for all those that may be implicated in the actual event of an accident.

In October 2019, a spokesperson for the Inspection and Enforcement Services in the DoL stated that "strengthening readiness procedures to deal with Major Hazard Installations must be prioritised" (Mphaha, 2019:n.p.). The spokesperson continued to highlight significance of compliance issues: in one province alone, compliance with MHI legislation was at a 55% level and updated risk assessment reports had not been received for 60 hazardous installations. The spokesperson identifies the major challenge as:

> *…dealing with infrastructure which is very old and anyone dealing with major hazards installations…must be fully alert at all times. We need to have personnel which are competent and professional to deal with major hazards installation incidents that can occur (Mphaha, 2019:n.p.).*

With this comment, the spokesperson is suggesting that the infrastructural issues are less resolvable than the human response, which is a worrying perspective. The hierarchical system for regulating hazardous installations, and the associated institutional framework for their implementation, thus resonates with what Beck (1995:11) describes as "gesture politics": the "centralization of data" under the auspices of government bodies that encourage risks to be "sweetened" by bureaucratic laws and associated safety pledges which are difficult to implement and uphold. In a similar vein, Hajer and Laws (2008:252) describe approaches by policy makers to deal with ambiguities, as "structuring reality to gain a handle on practical questions" and manage these on behalf of affected members of society. Risk society theory refers in this regard to a "polygamous marriage" between the sciences and business, politics and ethics: a consortium that have "a monopoly claim on rationality" (Beck, 1992:29).

As demonstrated by the lack of compliance, the system of registering hazardous installations is one of tokenism - appearing to be responsible, but not taking responsibility ("organised irresponsibility" according to risk society theory). Powerful institutions and multinational companies can, consequently, impose social risks, appropriate financial benefit, and disproportionately avoid the consequences of the risks (Aven & Renn, 2018). An interviewee for this research provided an apt example in our discussions, explaining how a fertilizer factory on the northern KwaZulu-Natal coast, were advised that their start-up operations should only be conducted when winds were blowing off-shore to avoid excessive concentrations of $SO_3$. Over time complacency led to the factory management authorising start-up when winds were blowing on-shore – "they ended up hospitalising a number of people and, in fact, one person died from that exposure … but they were never really taken to task on the fact that they had kind of accepted the risk… they never got punished for this" (IR1:15.03.2021).

What the lens of the risk society lens clarifies is how the DoL's difficulties in gathering and collating information about major hazards has little to do with the analytics, and much to do with apathetic attitudes and the *illusion* of control.

The following extract from one of my elite interviews suggests an awareness of flaws embedded in system for risk management, but also that these are difficult to erase:

> *And the problem, I think, the biggest problem is that people forget the logic and just go with the numbers. So they present these numbers as kind of universal truths. And you know it's a kind of fraud there's no real attention given to the fact that it does not make sense. What we find is that practitioners will have a bit of a gut feel about what they think it should be. And then when it doesn't compute to that number, they go back and wangle and jangle the numbers till it does.* (IR1:15.03.2021*)*

As this quote suggests the institutionalised regimen is, in effect, the 'cocoon' within which scientists conduct computer simulations of risk according to one kind of logic. In this respect Horlick-Jones opines that "craft skills involved in this work draw on formal procedures like mathematical modelling not so much as 'gateways to the truth' but as…devices to assist intuition" (Horlick-Jones, 1998:84).

It is obvious that relatively few fuel storage facilities like the one in this case study will leak, catch fire, or explode. Some might and, as empirical evidence has shown, the cause is most likely to relate to, or be compounded by, some or other form of human agency rather than a technical failure (Jasanoff, 2013). What Beck's theory alludes to is the potential for the 'protective barrier' afforded by the dominant discourse (what Beck calls the "relations of definitions") to break down when things come to a head, whether this is because of operational error, 'natural' events, or subversive tactics.

As an example, in South Africa, on 12 July 2021, a fire at a chemicals storage facility in Durban resulted in the release of toxic fumes across suburban areas, and an outflow of thousands of litres of chemicals that destroyed the entire ecosystem of uMhlanga estuary and oHlanga tributary (Comrie & van Rensburg, 2021). According to media reports, the owner of the warehouse claims the damage was caused by the Durban riots, during which the warehouse was set alight. The Minister responsible for environmental affairs, blames the damage on the failure on the part of the owners to secure the requisite EIA and MHI permits. From the perspective of affected residents, the government is at fault for not implementing the law which requires these permits. Similarly the explosion that occurred in Port of Beirut on 4 August 2020 has been described on one hand as the deadly results of an "exothermic reaction" between an oxidiser (nitrate) and a reducing agent (ammonium) (Bushwick, 2020:n.p.). The same event, according to a report by the BBC news, is described as the deadly result of "years of corruption and mismanagement" (www.bbc.com/news/ world-middle-east-53390108: 5 August 2020). Rao (2005) describes the varied forms of power that lurks behind the discourse as follows:

> *This (rhetoric) obscures the fact that structures are produced by agents, that some agents are more powerful than others, and that more powerful agents bear more responsibility for the structures they help to produce. Behind all structures are a number of agents – agents that have names, faces, addresses and bank balances. If structures are ever to changes it is necessary to identify the agents that produce and reinforce them (bearing in mind the structural constraints within which their agency operates)* (Rao, 2005:30-31).

This points to the deeply systemic problems in the risk society. Unfortunately, had either the UPL or fireworks storage facilities, referred to above, been 'authorised', it is not clear how the outcome would have been different. In the aftermath, when the risk has been replaced by the damage, formal reasoning gives way to political struggle (Holzer & Sørensen, 2001). Following the UPL fire in Durban, a meeting was called among residents and NGO's in order to devise a way to hold both the chemicals company and the authorities accountable. As one stakeholder pointed out at the meeting, "if civil society is excluded from the investigation and information flows then the authorities are not dealing with people's anxiety and fears - including beach-users and families anxious about the future health of their children" (Carnie, 2021b:n.p.). In this response on the part of stakeholders the requisite features of risk are evident – potential for harm, the object of value and the need for a strategy.

This type of intervention is also what Beck describes as the 'active' side of sub-politics - initiated outside the official system of governance, via predominantly social movements. Reflected in the comments made by resident is sub-politics' call for the formation of "rhetorical citizens with the capacity to make judgments regarding scientific and technical controversies by understanding that even scientific work is a form of persuasion" (Danisch, 2010:173). According to risk society theory sub-political activity does not take place within the rational public sphere of polite conversation, as envisaged by Habermas (1984). Instead it is about:

> *bypassing the institutions of representation (political parties parliaments) and often even lacking the protection of law. In other words, sub-politics means the shaping of society from below"* (Beck, 1992:39*).*

Had Beck lived to witness the Me 2 movement, the Black Lives Matter campaign, and the marches taking place at COP26, arguably he would have endorsed such activity as the epitome of sub-politics.

#### Explaining risk: A narrative of irony

Beck's reference to risk as a "narrative of irony" (Beck, 2006:329) is reflected in the wider response to the bulk fuel storage facility proposal. The engagement process

documented in the Comments and Response report, which forms part of the EIA, was dominated by opposition, not from anxious residents or adjacent land users, but from competitors in the fuel market. The most vocal amongst these was the Chevron-owned Milnerton Refinery. At the time Burgan's proposal was mooted, Chevron had 90% stake in what is an approximately 4 billion-litre/year fuel (diesel & petroleum) market in the Western Cape (Ratshomo and Nembahe, 2017).

As shown in Figure 9, the plant is located across the bay from the harbour. In addition to its large fuel storage 'tank farm', the operation has refining capacity of approximately 100 000 barrels of crude per day (South African Petroleum Industry Assocation, 2020). The refinery's infrastructure includes an underwater pipeline, which the proposed fuel storage depot is entitled to share in terms of the Petroleum Pipelines Act cited in the background to the project.

Figure 9: Relative location of bulk fuel storage depot and the Chevron refinery


Chevron Refinery's legal team built a comprehensive case against the proposed bulk storage depot, prompting the proponent of the fuel storage facility to threaten a lawsuit against the company for anti-competitive behaviour (Odendaal, 2014). This

also delayed the finalisation of the EIA. Chevron's negative response to the proposal was financially motivated and linked to its aging infrastructure. Built in 1966, the refinery was unable to meet technical specifications for production of low sulphur fuels, in line with government policy and public demand. Reports indicate that the required upgrades would cost in excess of 12 billion (ZAR) - an amount that Chevron could not afford without a government subsidy (Vecchiatto, 2015).

Notwithstanding the cost to Chevron, the energy regulator (NERSA), in a presentation to the Parliamentary Portfolio Committee on Energy (May, 2015), was unsympathetic:

> *Because Chevron cannot keep up with demand for CF2 (Cleaner Fuel 2) compliant fuels in the market, it has put forward arguments (against the proposed fuel storage facility) designed to protect its market position and to slow down the market transition away from fuels that it does produce towards fuels it cannot produce enough of* (Crompton, 2015:n.p.).

The counter argument submitted by Chevron centred around possible closure of the refinery and consequent job losses which, the company claimed, would be way in access of the jobs that would be provided by the fuel storage facility.[16] However, not excepting the proponent of the bulk fuel storage facility, Chevron wanted all potential rivals to be denied licenses to import and store fuel, until it had secured the funds to modernise its facility. In other words, they wanted a level playing field from which to compete, at government's expense. Despite Chevron's significant contribution to the local economy, NERSA's predilection in this matter was skewed towards protecting its own stake in the bulk fuel storage facility linked to South Africa's electricity public utility's (Eskom) need for extra diesel 'to keep the lights on' (Odendaal, 2015). The South African Cabinet was also supportive of Burgan's venture, because of their vested interest in the success of 'Operation Phakisa' (described in the background to the project) which falls under the auspices of a Parliamentary Infrastructure Co-ordinating Committee (PICC).

[16] Chevron employs approximately 350 people at its refinery, whereas the new storage facility offers permanent employment to less than 30 people. In addition Chevron has 1 250 contract employees, and approximately 13 000 workers in its distribution network.

In the final chapter of this dispute, shortly after the fuel storage depot started operating at the harbour, Chevron sold the Milnerton Refinery and the entire fleet of 'Caltex' branded filling stations across South Africa. The buyer – Astron Energy – is backed by another large multinational company (the Glencore Group), purportedly capable of investing in the technological upgrades required to enable the refinery to compete in the import-export fuels market (Cloete, 2019).

The competing agendas and motives that constitute the explanatory dimensions for the case study, exemplify Beck's depiction of reflexive modernity. This situation also exemplifies the IA conundrum for South Africa alluded to in Chapter 1: how to marry disparate social, environmental and economic priorities. According to one of my interviewees, "risk assessment is not properly done if you haven't factored in societal perception of risk…the whole system in South Africa is weighted overwhelmingly from a risk point of view in favour of industry" (IR2:19.03.2021).

More so, the case study speaks to layers of risk, and what Beck refers to as the "latent" effects of modernisation: "we are therefore concerned no longer exclusively with making nature useful, or with releasing mankind from traditional constraints, but also and essentially with problems resulting from techno-economic development itself" (Beck, 1992:19). It is also clear from this case, that power sometimes influences decisions in ways which, as Richardson has indicted, never enter the public domain, and may be "subliminal to most actors in the process" (Richardson, 1996:290).

## Summary of findings

A key premise for Beck's theory is that people's health and civic rights are innately endangered by post-modern technologies, which has created "new rules for consultation and decision-making" (Beck, 1995:11). With reference to Figure 8, the interpretation of risk in this case clearly centres on the narrower part of the legislative and institutional hierarchy, rather than the Constitutional rights of communities to an environment not harmful to health and well-being. Earlier I have suggested that the role of the specialist study can be viewed as distinct of that of the IA: the aim of the former being to produce sufficient, substantiated evidence to inform the assessment

component of impact significance; and the function of the latter being to convey the evaluative component, as well as address cumulative impacts. That said, in my experience and as several commentators on IA in South Africa have acknowledged, the values represented in the final report are all too often those ascribed by the IA team of practitioners and specialists, rather than an adequate representation of stakeholder concerns (Cape et al., 2018; Retief et al., 2013; Retief et al., 2020; Rossouw, 2003).

A difficulty highlighted in this case study relates to technical language used in the specialist report and reproduced in the IA, which tends to be obtuse and inaccessible for public stakeholders. Consequently, the meaning of risk is appropriated by experts and subjected to a multitude of assumptions and disclosures. The effect is to mask underlying uncertainties about the potential manifestation of harm. As Stirling (2010:1030) has stressed, today's world is too complex for scientists' penchant to "treat every problem as a risk nail, to be reduced by a probabilistic hammer". Citations from the text in the assessment reveal how the use of germane acronyms and 'scientised' explanations serves to isolate the study, making it difficult for ordinary citizens to question the outcome from a social perspective.

What the interpretive dimension of the analysis shows is how the "low probability" ratio does not compensate for the limitations of the one dimensional definition of risk, and its vulnerability to power imposed by political and economic forces - embodied in this case by the dispute with Chevron and influence of government institutions. To retain credibility the study must appear immune to these sources of power, despite their decisive role in the outcome of this case. The study focuses on the 'distribution' of risk in society, facilitated by an institutional framework which 'normalises' the outcome of the assessment, leaving little room for alternative knowledge claims. Alexander (2018:207-208) explains that powerful groupings of people "transmit certain ideologies as if they have unquestioned validity" and it is these the impose the boundaries on the study.

The explanatory component of the discourse analysis draws attention to the broader societal and economic circumstances that constitute the setting for the specialist study. This dimension exposes the position of powerful authoritarian stakeholders

and what becomes of their mandate to protect members of the public. In this regard, the existence of potentially harmful facilities that the responsible authority appears to have no knowledge shows the disconnect between the political and social sphere. Whilst political institutions juggle the economic priorities of business and government, the critical social component of the risk equation is overlooked.

Finally, the explanatory dimension of the study reveals the more serious risks stemming from competing agendas in the broader milieu. In this respect the EIA for the fuel storage depot was caught up in trade-offs, arguably, where it did not belong. Underscored by the case study are the mutual dependencies between institutional decision processes and the influential agendas of government and multinational firms.

Revealed by parliamentary debates and the threat of litigation in the explanatory dimension, is how the EIA for the fuel depot became a vehicle for a struggle that had to do with a far broader spectrum of risks across society. Beck describes this as the flipside of progress: it is evident that "the afflictions" produced are no longer "tied to their place of origin – the industrial plant" (Beck, 1992:22). In this bigger picture the initial failure of government's investment in coal-based processing facilities to produce sufficient energy, is instrumental in creating a market for fuel storage which, in turn, prompts objections by competitors who cannot meet the same government's 'standards' for cleaner fuels. Behind the arguments for and against the fuel storage facility, is a concerning lack of institutional planning and investment in alternatives to fossil fuels and to the wholesale dirty energy production process in the country, contributing to burgeoning risks for South African society as a whole.

The case underscores Beck's contention, that past experience of industrialisation encourages anticipation of the wrong kind of risk, the one we believe we can calculate and control, whereas the problem lies in what we do not know and cannot calculate: "the bitter varieties of this risk paradox are virtually endless" (Beck, 2006:330).

In the long durée, the neglected consequences of uncertainty tend to converge on the most vulnerable sectors of society where people have few choices about being exposed to negative effects. Freudenburg and colleagues (2009:166) highlight in this regard

that “there is no evidence, unfortunately, that our ability to foresee harm has kept up with our ability to create it”. According to Beck (1995:4), “that is how we live at the summit of world history, where the future spreads out over the plain of the nothing new. More! Bigger! Keep it up!”. Underscoring the pervasive phenomenon of risk is the correlation between the bulk storage facility, the Chevron Refinery and the South African government’s persistent reliance of fossil fuels, with systemic risk implications borne of global warming and climate change.

# Chapter 7

# Case study: Proposed nuclear power plant for South Africa

In this case study I apply discourse analysis, using the lens of psychometric theory, to explore the EIA for a proposed nuclear power plant for South Africa. The aim is to apply a psychological lens via which to appreciate competing constructions of risk, and associated implications for stakeholder values and power dynamics. Unlike the bulk fuel storage facility described from the perspective of risk society theory in Chapter 5, the nuclear power project has not come to fruition, although the EIA was approved by the then Department of Environment Affairs in 2016.

I begin the chapter with a description of EIA in South Africa and some of the generic challenges associated with the prevalence of this tool. I then provide the background for nuclear power in South Africa, followed by the discourse analysis of the comments and response report in the EIA. As indicated in Chapter 5, this case study is the most complex of the three in respect of the amount of available data, and I had to be selective in scaling this down to a manageable amount. The focus of the analysis is on the stakeholder engagement component of the assessment, given its relevance to the psychological interpretation of risk. Textual extracts are drawn from the Comments and Response report appended to the EIA application. These are indicative of a disconnect between expert and public perceptions of risk in the context of EIA, and the implications of this divide for the communication between the stakeholders and the EAPs.

## The Environmental Impact Assessment

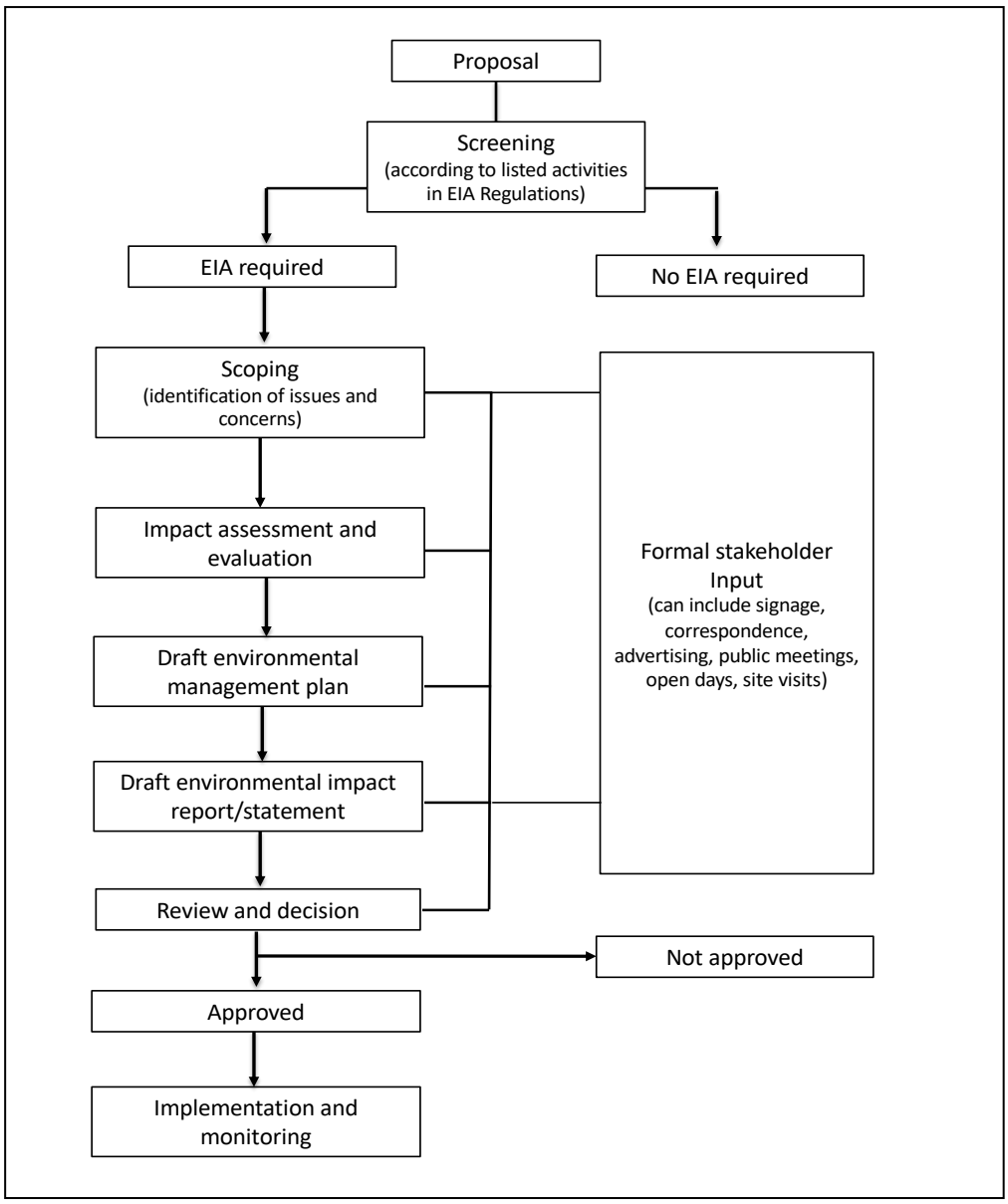
South Africa is one of over 200 countries in the world that relies on a formal and legislated system of EIA to anticipate and manage environmental effects of development projects (Wood, 2002). Although the practice of EIA in South Africa dates to the late 1980s (Sowman et al., 1995), the detailed regulation thereof has its roots in the final Constitution of 1996. As indicated in the previous chapter, section 24

of the Constitution accords South Africans a fundamental right to an environment not harmful to their health or well-being. The same section allocates responsibility to the Executive to pass "reasonable legislative measures" to support this right. Two years after the Constitution was finalised, the National Environmental Management Act (107 of 1998) (NEMA) was introduced. In terms of this Act the Minister of Environment is empowered to list certain activities which may not commence without environmental authorisation. There are currently three such lists in the schedules to the EIA Regulations, amounting to more than 250 controlled activities.

According to Wood (2002:4), South Africa's EIA procedure has the attributes of a "sophisticated developed country EIA system". In common with such IA regimes, EIAs in South Africa are privately commissioned and paid for by the prospective developer, but institutionally governed. The project proponent appoints the EAP, who in turn, commissions the expert studies (such as that presented in the previous chapter), information from which forms the basis of an evaluative framework, considering the extent and significance of anticipated project related impacts. The final report is submitted for review and decision-making to one of nine provincial Departments or, under prescribed circumstances related to location and scale, to the national Department responsible for the environment. As part of this process stakeholders must be consulted, at minimum, during the scoping phase, and be provided with opportunities to comment on the draft report. All comments must be responded to by the EAP and a complete record of communications is appended to the final report. It is this record that forms the primary source of data for the discourse analysis in the case of the proposed nuclear power plant.

The approach to EIA in South Africa is consistent with the 'classic' EIA procedure referred to in Chapter 2, that is implemented in many countries the world over (Morgan, 2012). The procedure is depicted in Figure 10. The step-by-step process follows the rational planning philosophy for IA envisaged in the US's NEPA, in terms of which the definition and approach to IA was first introduced (Caldwell, 1998a).

Figure 10: Key stages of EIA in South Africa (Adapted from Aucamp, 2009)




As indicated in previous chapters, the merits of the rational approach have been subject to scholarly debate over many years, with numerous critics highlighting the constraints of the model and its limited ability to account for stakeholder values. Also mentioned in the Introduction to this thesis, are concerns on the part of South African commentators, about the quality of EIAs produced according to prescribed procedures within a strictly legislated EIA framework (Alberts et al., 2019; Audouin, 2009; Kidd et al., 2018; Retief, 2011; Sandham et al., 2013; Sandham & Pretorius, 2008). Contributing to this problem is the sheer number of EIAs required in terms of the detailed and

relatively low thresholds set in the listing of activities in the Regulations, as per this example of Listed Activity 7 in Government Notices 325 [17]:

> *The development and related operation of facilities or infrastructure for the bulk transportation of dangerous goods*
> - *in gas form, outside an industrial complex, using pipelines, exceeding 1 000 metres in length, with a throughput capacity of more than 700 tons per day;*
> - *in liquid form, outside an industrial complex, using pipelines, exceeding 1 000 metres in length, with a throughput capacity of more than 50 cubic metres per day; or*
> - *in solid form, outside an industrial complex, using funiculars or conveyors with a throughput capacity of more than 50 tons per day.*

Reams of similar triggers for EIA, has led to South Africa having one of the highest production rates of EIAs globally, averaging 3 600 EIA reports per year (Kidd et al., 2018). Inevitably this scale of EIA practice and the pressure on the authorities to process submissions, has led to resource and capacity challenges (Kidd et al., 2018). Under these circumstances, amidst the paperwork, case officers and decision makers, tend not have the time (or arguably the will) to meet with diverse stakeholders on a project-by-project basis. The consequence of this is clear in the following three excerpts from one of the interview transcripts for this research:

> *And I also know that lots of decision-makers refuse to meet with IAPs but they quite happily meet with developers, they quite happily meet with EAPs.* (IR2:19.03.2021)

> *…decision-makers are actually not part of the IA process in South Africa. They are very much removed from it, deliberately. I find that problematic. So they are passive receivers of information.* (IR2:19.03.2021)

> *Our decision makers don't have an emotional response to the decisions they make – they don't have to stand in a public meeting, they don't have to have tea or discuss their decisions with IAPs unless they get dragged to court.* (IR2:19.03.2021)

By absenting themselves from public meetings, site visits and so forth, the authorities depend all the more on the IA report for decision making and recommendations.

[17] Government Notice 325 (as amended) *GG* 40772 of 7 April 2017.

Minutes of meetings and comments and responses are appended to reports as testimony to stakeholder engagement, but as some critics have pointed out, the requirement to include a record of engagement, does not mean that the concerns of stakeholders are as consequential in decision-making as other inputs by EAPs and specialists (Partidario & Sheate, 2013).

As has been mentioned in Chapter 1, affecting the inclusivity of the IA process is the imperative in South Africa to make the process as efficient as possible by tight scheduling, procedures to facilitate co-operation between government departments, and other streamlining measures (Sandham et al., 2013). Consequently, and reflected in the case study, the scope and parameters of EIA are chiefly defined by prescribed requirements rather than changeable environmental circumstances and social sensitivities. In this regard, Sandham and colleagues (2013:161) have argued that the benefit of a mandatory system of EIA may well be overstated: "the challenge posed to deliver sustainable outcomes seems to be hampered by an overly complex and rigid legislative regime".

Public apprehension about the performance of the South African EIA system is also reflected in media reports and the increasing number of court rulings in which judges have found EIAs to be wanting, occasionally in respect of the technical information in the reports, but more frequently regards promotion of administrative justice and access to information.[18] Whilst this demonstrates the value of the horizontal balance of powers mandated by the South African Constitution, it is also an indicator that IA is not performing optimally as a democratic tool in support of sustainable development.

[18] The Centre for Environmental Rights describe seventeen environmental matters that have come to court between February 2020 and February 2021. Some examples in which EIA is involved include: Earthlife Africa v Minister of Environmental Affairs & Others [2016] (65662/16) Gauteng Division (19 Nov 2020); Duduzile Baleni & Others v Regional Manager: Eastern Cape Department of Mineral Resources & Others [2015] (96628/2015) Gauteng Division (11 Sep 2020); Global Environmental Trust & Mfolozi Community Environmental Justice Organisation & Others v Tendele Coal Mining (Pty) Ltd & Others [2021] (1105/2019) ZASCA 13 (09 Feb 2021); South Durban Community Environmental Alliance v MEC for Economic Development, Tourism and Environmental Affairs: KwaZulu-Natal Provincial Government [2020] ZASCA 39 (17 April 2020); Khanyisa Community Development Organisation & Others v Director: Development Management: Western Cape Department of Local Government, Environmental Affairs and Development & Another [2020] (10032/17) WC Division (5 March 2020).

The source of concern, among NGOs and CBOs, reflects some of the initial worries about the appropriateness of the US model of IA for countries like South Africa and other LMICs - where citizens are prone to judge projects in terms of immediate socio-economic benefits, with environmental concerns, for many citizens living in poverty, constituting an "unaffordable luxury" (Fuggle, 1990:34). This dilemma is captured in a statement by the former Minister of Housing, reacting to delays in authorisation of a low-cost residential development:

> *We cannot forever be held hostage by butterfly eggs that have been laid, because environmentalists would care about those things that are important for the preservation of the environment, while we sit around and wait for them to conclude the environmental studies* (Cited in the Mail and Guardian newspaper in March 2006).

Given the energy crises in South Africa, arguably, the Department of Energy may well have a similar apprehension about IAs for new electricity production facilities. Irrespective of these circumstances, a nuclear power station is not comparable to other types of development. In this respect Hecht (2010:1) writes about the "power of nuclear things" highlighting the issue of "exceptionalism". Exceptionalist claims carry the sense that an "immutable ontology" distinguishes the nuclear from the non-nuclear, implying that "nuclear things" are "either sacred or profane" (Hecht, 2010:4). This case study testifies to Ylönen and colleagues' submission that public discussion about nuclear technology always entails elements of exceptionalism, arguments for which are easily strengthened in times of economic and political crises (Ylönen et al., 2017).

## Background to the project

When the EIA for the nuclear power station (referred to as Nuclear-1 in the EIA Report) was initiated, South Africa was one of 30 countries in the world that generates a portion of its electricity supply from nuclear energy, and the only country that does so on the African continent. According to data in South Africa's 2019 Integrated Resource Plan (IRP), approximately 5% of the country's energy supply is generated by nuclear fission, compared to 85% from burning of coal, with other sources (natural

gas, diesel, hydro and renewables) making up the remainder (Department of Energy, 2019).

To provide some perspective on where South Africa stands in relation to global trends, there are 440 nuclear reactors, responsible for about 10% of the world's energy supply. Proponents of nuclear energy stress its efficiency, safety and low-carbon output compared to other sources (Goodfellow et al., 2011; Kemm, 2020; Motta, 2016), and statistics produced by the *World Nuclear Association* reveal a slow but steady uptake of nuclear, since the early 1970s. Notwithstanding this trend, a number of countries are changing their policy on nuclear energy (Dittmar, 2012; Gralla et al., 2017). Germany, for example, will have shut down all of its six nuclear power plants by 2022. Japan's reliance on nuclear energy has also decreased, from 30% before the Fukushima disaster to just 8% in 2019. The United States, historically one of the largest users of nuclear, has re-orientated its energy policy toward natural gas, partly in response to political campaigning against nuclear energy, as well significant investment in hydrofracking for shale gas.

According to reports by the World Nuclear Association (2020) Russia and China are currently the most active in developing nuclear energy, with 85 nuclear reactors between them and more under construction. Chinese vendors are also the most active in terms of new builds in other parts of the world, currently contracted to construct eleven nuclear power reactors mostly in Asia and the Americas.

In South Africa there are two nuclear reactors, both situated in the Western Cape (Koeberg 1 and 2). There is also a defunct demonstration plant comprising components of a pebble bed modular reactor (see Box 3) for an explanation in this regard). The operable Koeberg reactors have a combined net capacity of 1.8 gigawatts. The plant housing both reactors is owned by the South Africa's electricity public utility company, Eskom, which produces 95% of South Africa's electricity. Eskom is the proponent for the Nuclear-1 project. Hence, the EIA was commissioned and paid for by Eskom; and owing to the strategic importance of the proposal, the assessment was adjudicated by the National Department responsible for environmental affairs.

**Box 3: Status of South Africa's pebble-bed reactor**

South Africa was one of the first countries to invest in pebble bed technology during the 1990s, and the project was met with mixed reactions from the public. Nevertheless, national government endorsed the project, and Eskom proceeded with the manufacture of a demonstration plant. However, as the costs of the technology increased, so the project proved both less scientifically feasible and less economically viable than anticipated (Campbell, 2019). Ten years on, and the demo facility was placed in 'care and maintenance'. This happened in 2010, after construction of a reactor pressure vessel, the core barrel assembly and reactor graphite internals. Given Eskom's current financial difficulties, the utility company is seeking to sell the components of the demo plant to raise capital.

## Discourse analysis

In this study, instead of entering the analysis via the descriptive dimension as I did with the previous example, I begin with the explanatory dimension, thereby 'setting the scene' for the two discursive dimensions (interpretive and descriptive). In the analysis, the lens of the psychometric paradigm highlights how risk has been framed in relation to key areas of concern about the proposed nuclear power station, and the effects of such framing on interactions between the EAPs and the public stakeholders.

### Explaining risk: Politics and power

To use an example of an EIA for a nuclear reactor seems almost too convenient to demonstrate the relevance of alternative interpretations of risk, and the psychometric paradigm in particular. This is especially in light the "exceptionalism" argument around "nuclear things" (Hecht, 2010:1), that I have previously referred to. Nonetheless, the relevance of the nuclear energy debate in South Africa to the topic of this thesis is difficult to ignore. Reflected in debates about nuclear energy the world over, this option for South Africa is inseparable from broader deliberation over the merits of alternative sources of power, whilst heeding the global imperative to reduce carbon emissions. As implied by exceptionalism, it is also inseparable from the stigma

and controversy that nuclear technology has been prone to since atomic power was first conceived (and used) as a deadly weapon in the 1940s. Flynn (2003), quoting Weart (1988), observes how "nuclear power involves potential dangers that resonate with deeply responsive social-cultural beliefs, re-enforced in the large number of stories about nuclear-related events" (Flynn, 2003:327).

From the perspective of psychological risk theory, nuclear embodies what risk analysts refer to as the low-probability, high consequence scenario. This scenario is particularly prone to divergent discourses in relation scientific facts on the one hand, and stakeholder perceptions on the other (Covello & Sandman, 2001). As one of the interviewees for this research points out, it was the Nuclear-1 assessment "where the principles of risk were absolutely, you know, bang centre of everyone's concern…the perfect metaphor with what you deal with in EIA" (IR1:15.03.2021).

The EIA process for the proposed nuclear power plant was initiated in 2008 and continued over a nine-year period. This was a time of political turmoil in South Africa. Events associated with wide-scale corruption, nepotism, espionage, and the eventual ousting of the former State President were ongoing, in a period defined by "State Capture". Against this backdrop, the EIA for the nuclear power plant is implicated in what has been referred to in the media as the infamous "nuclear deal" (Thamm, 2019:n.p.).

The details of this transaction are intricate and convoluted, but much of what transpired can be deduced by the identity of the parties to the nuclear deal: the former South African President (currently under a 15-month prison sentence), a Russia-based nuclear reactor vendor (Rostom), members of the notorious Indian family linked to State Capture (the Guptas – currently subject to 'Red Notices' issued by Interpol), and the President's son, also co-owner (with the Guptas) of the Shiva uranium mine outside of Pretoria. Exactly how the nuclear deal was engineered has been the subject of an extensive media probe, and subsequent expose covering, among other specifics the former President's firing of the finance minister after he twice declined to sign a letter drafted by the energy minister providing a guarantee to the Russian government on supplying reactors to South Africa's nuclear programme (Chipkin et al., 2018).

Final confirmation of corrupt intentions behind nuclear procurement came by way of a High Court ruling, in April 2017.[19] The Western Cape Division formally set aside three intergovernmental "Nuclear Cooperation Agreements" with countries, including Russia. According to the Judgement, the ministerial determinations to acquire reactors along with the approvals by the Regulator (NERSA) were invalid because they were "unlawful", "unreasonable" and "procedurally unfair". Eskom's appointment, as the procuring agent for a nuclear power plant, was consequently set aside. By the time the 'nuclear deal' had been exposed, the EIA for intended nuclear build had been approved by the Department of Environmental Affairs, but the authorisation was moot as a result of the High Court ruling. Despite what has happened, South Africa's Department of Energy have, according to reports, secured an endorsement from the regulator (NERSA) to restart the process in August 2021 (Yelland, 2021). By law, Eskom would have to engage again with stakeholders and re-apply for environmental authorisation.

#### Interpreting risk: Power disruptions

Over the last decade South Africa has suffered a severe shortage of electricity, and as has been highlighted by State Capture, a commensurate shortage of integrity among political leaders responsible for the delivery thereof. Over the course of about twenty years Eskom has regressed from one of the country's more efficient utility companies to one which has amassed over 450 billion rand in debt (Crompton, 2020). As a result, special legislation has been enacted to make provision for up to 60 billion rand in bailouts (Eskom Special Appropriation Act, 7 of 2015). In 2020, the Treasury allocated 26 billion to keep Eskom afloat.

Notwithstanding, contributions from the taxpayers' purse, South Africans still endure frequent rotating blackouts. These outages are a consequence of ongoing maintenance issues and breakdowns at the aging fleet of coal-fired plants, as well as at two relatively newly completed, but under-budgeted and poorly designed, power stations in the northern province of Mpumalanga, namely, Medupi and Kusile. The crisis is

[19] Earthlife Africa Johannesburg & Another v Minister of Energy & Others (SA 227 [WCC], 26 April 2017).

further exacerbated by electricity theft, a culture of non-payment and defaulting municipalities (Crompton, 2020). The majority of the Eskom Board, under whose oversight the parastatal has gone into decline, have resigned, including the former CEO, and some have been prosecuted for their involvement in State Capture. Although new appointees have devised a credible recovery plan, it is envisaged that it will take many years to remedy the damage that corruption has bought to bear on the country's power utility (Winkler, 2021).

An important policy resolution in redress of the electricity crises and the country's reliance on coal, is to increase supply from renewable energy sources. In line with South Africa's commitments to the Paris Agreement on Climate Change, government has sought to encourage investment in solar and wind installations via the REIPP programme (Renewable Energy Independent Power Producers). The programme, which began in 2011, offers a series of 'bidding windows' during which private renewable energy developers can apply for an allocation of supply to feed into the electricity grid. Despite positive outcomes when it was first implemented, political support for the programme appeared to wane after the first three rounds of bidding (Meier et al., 2014). Inexplicably, the DoE delayed the fourth bidding window, in conjunction with Eskom's deferral in issuing budget quotes to the Round 3 preferred bidders. Contracts were finally signed off in April 2018 after a 33-month postponement. After yet more unfathomable delays, the fifth round was eventually announced in March 2021. Prospective solar and wind farm developers had until August 2021 to submit bids for projects generating in 1 600 MW of wind and 1 000 MW of solar capacity. The winners of the fifth round were announced on 28 October 2021. Although building can process, according to energy forecasters, contributions from these projects will only start to alleviate pressure on the grid in 2024 (Winkler, 2021).

In order to retain the existing nuclear contribution, application has been made by Eskom to extend the life of the Koeberg reactors, by 20 years to 2044. The timing of the applicable Government Notice[20] coincided with the first peak of the COVID-19

[20] GNR 694 in *GG* 43456 of 19 June 2020

outbreak in the Western Cape, suggesting that the DoE were, arguably, hoping that the novel Corona virus would distract citizens from justified suspicions about any form of nuclear-related propositions.

With regard to new sources of supply, as indicated above, the DoE appears determined to keep the nuclear proposition in the mix. In January 2021 the regulator issued a consultation paper, and called for public comment on a determination to procure 2 500 MW of new nuclear power for South Africa. In response, a leading anti-nuclear NGO comments as follows:

> *The level of trust in Eskom is at an all-time low. South Africans are tired of load-shedding and annoyed that tax revenue continues to be diverted from essential services to bailout dysfunctional state owned enterprises. What reassurance do we have that a new state-owned nuclear project will be any different?* (https://safcei.org/)

Responding to government's intentions, a column by energy expert, Chris Yelland, (Yelland, 2021), denouncing nuclear as a "no regret"[21] option, elicited a slew of responses on the website of the *Daily Maverick* (https://www.dailymaverick.co.za/article/2021-02-05-south-africas-new-nuclear-power-plan-is-a-high-regret-option) including this one that sums up the sentiment of several other commentators:

> *(T)he main threat for South Africa from adding new nuclear generation is simply the inherent secrecy that surrounds nuclear projects. South Africa should have learned…that mega-builds covered in nuclear secrecy is one dark tunnel we'll never likely emerge from… There are some very bad people with enormous power for whom the prospect of secret nuclear deals are just the ticket to cover up new depths of malfeasance. Battered and bruised tax-payers say NO!*

Even without the tainting effect of State Capture and the nuclear deal, for many in the non-government and private sector, nuclear procurement is an anathema; particularly given the suitability of conditions in South Africa for large production of wind and solar energy. Although government has repeatedly touted the "no regret" 'by-line' for

[21] No regrets options are those that generate net social or economic benefits irrespective of whether or not climate change occurs (Siedenburg, 2012).

nuclear (Department of Energy, 2019), the lens of the psychological theory reveals nuclear to be a very controversial and divisive proposition.

The response to nuclear facilities in South Africa, is consistent with the results of the earliest psychometric studies undertaken by Slovic (1987). These reveal that nuclear power is rated, among lay persons generally, as the most risky, topping a list of 30 activities and technologies. Experts judge nuclear at number 20 on the same list. This work shows that the expert rating is more closely correlated with estimates of actual annual fatalities. Appreciably, lay perceptions point in the direction of other qualities of risk, stemming from nuclear, including involuntary exposure, catastrophic effects, certainly fatal outcomes, unfamiliar technology, invisible and delayed impacts, not controllable, and so forth. All these factors are exacerbated by lack of trust, which the background to nuclear procurement in South Africa outlined above, clearly testifies to. 'Dread' factors are thus key in shaping public debate in response to the Nuclear-1 EIA, as is evident in the descriptive dimension of the analysis that follows.

#### Describing risk: Harm, strategies and values

As explained in the methodology Chapter 5, the duration and complexity of the nuclear EIA resulted in a quantity of data beyond what is usual for CDA. Focusing on the comments and response report and coding of the text therein, led me to identify distinct themes, around which I structure this textual dimension of the analysis.

The first key concern for stakeholders relates to precedents for nuclear disasters. This theme is reflected in cognitive mapping of psychometric factors and is particularly relevant to Slovic's depiction of the affect heuristic, described Chapter 4 (Slovic et al., 2007) The second theme is more strategic, to do with the availability of alternatives. It speaks to the broader debate in South Africa about the merits of independent producers of primarily renewable energy, versus the centralised production (by Eskom) of coal, gas and nuclear derived power. A third theme in the comments and response report links to values - the ethical and moral dimensions of the nuclear proposal, particularly in light of the corrupt motives that I describe in the explanatory dimension.

*Theme 1: Nuclear radiation and the fear factor*

High profile nuclear accidents, although relatively few in number, provide a particularly powerful set of heuristics via which social actors 'make sense' of the potential consequences of radiation exposure. These types of phenomenon become symbols, or emblems according to Hajer (2004), that can signify something beyond what happens on the ground. Nuclear accidents are prime among examples of incidents where the *phenomenon* of the event becomes emblematic, and therefore almost more significant than the event itself (Lockie & Measham, 2012).

In the case of Nuclear-1, both the Chernobyl nuclear disaster of 1986, and the Fukushima incident which happened in March 2011, were important somatic markers (instances of feeling generated by secondary emotions) for stakeholders in the engagement process. The source of Slovic and colleagues' (2007) heuristic affect is captured in Alexievich's (2017:30) reflection on her interviews with those directly affected by Chernobyl:

> *I realise they were consciously converting their suffering into new knowledge, donating it to us. Telling us: mind you do something with this knowledge, put it to some use.*

The following exchange in the comments and response report reveals the disparity between an experiential or intuitive versus analytical interpretation of such 'memorable' events. This comment was submitted by a resident of Gansbaai – a small coastal town neighbouring one of the alternative sites.

> **Stakeholder comment** (EIA:12/12/20/944:V3:02.2016:*164*):
>
> The Fukushima nuclear disaster in Japan has left 20000 dead - 80000 people have been evacuated from a 20km exclusion zone…extended in certain areas because of heightened radiation levels. Many livestock and pets were abandoned and have died from hunger. There is a no (sic) fishing ban within 30km of the affected area. The disaster is ongoing and the area will probably be lost to generations of Japanese people. Twenty-five (25) years ago the Chernobyl Nuclear Power accident created a sterile 4500sq km exclusion zone. Is it not the Department of Environmental Affairs of our Government and the National Nuclear Regulator's duty to protect the Environment and

the citizens of South Africa and their future generations, against the myriad of impacts and possible disasters created by granting Eskom a license for Nuclear 1?

**Response** (EIA:12/12/20/944:V3:02.2016:*164*):

Whilst the Fukushima Daiichi incident is without a doubt a highly undesirably event, as it could have led to loss of life, some perspective is also required on this event. The tsunami was responsible for the loss of approximately 20,000 lives, the evacuation of approximately 450,000 people and the complete destruction of several coastal towns. On the other hand, not a single death or serious injury due to the radiation release from the power station has been recorded to date. You are correct, it is the duty of the Department of Environmental Affairs, as a government department and Competent Authority in terms of the EIA, to evaluate and disseminate all information placed before it in terms of the provisions of the National Environmental Act and the principles of Integrated Environmental Assessment and Sustainable Development within the South African context. The National Nuclear Regulator on the other hand is the Competent Authority for ensuring that individuals, society and the environment are adequately protected against radiological hazards associated with the use of nuclear technology in South Africa.

What is clear in this exchange is the extent to which the stakeholder has extrapolated the consequences of the prior nuclear events. In their response, the EAP does not refer these as a "disaster" or an "accident". The terms they use are considerably more benign (or passive) - "undesirable", "regrettable" and "preventable". Alexander (2018:199) refers to words or phrases that downplay (pacify) potential for harm as "purr words". Whilst the response by the EAP is factually accurate, it fails to acknowledge the stakeholder's concern with knock-on effects and associated human suffering. The risk is confined to unambiguous categories of "death" or "injury". Stakeholders are reminded of the duty and competence of the authorities – notwithstanding a multitude of reasons to be distrustful of the relevant state institutions, as indicated in the explanatory dimension of the analysis.

Important about this interaction (which is one of many similarly themed exchanges focusing particularly on Fukushima and Chernobyl) is that it shows how the legacy of events in the past persists, because of the space-time compression generated by the

media and technology. Unfiltered content is available in real-time on digital platforms, and the details are captured in media reports, films, books, personal accounts and so forth. It is via these channels that ordinary people gain access to the desires, regrets and sadness of the people caught up in the events. Alexievich's (2017) collection of first-hand accounts of those directly affected by Chernobyl is a good example. In an interview with herself (as a resident in Belarus at the time) the author writes:

> *I have been asking myself ever since: what was I bearing witness to, the past or the future? It would be so easy to slide into cliché. The banality of horror. But I see Chernobyl as the beginning of a new history: it offers not only knowledge but also prescience, because it challenges our old ideas about ourselves and the world. When we talk about the past or the future, we read our ideas about time into those words; but Chernobyl is, above all, a catastrophe of time…this is not a book on Chernobyl, but on the world of Chernobyl* (Alexievich, 2017:24).

The Social Amplification Model for risk (Kasperson et al., 1988; Pidgeon et al., 2003), which draws on the psychometric paradigm (as described in Chapter 4), explains how the 'quality' of risk tends to be shaped and magnified in signals transmitted via various communication channels. In a genre that contrasts with Alexievich's intimate first-person account, the 2019 television series titled "Chernobyl", directed by Johan Renck, provides a dramatic re-enactment of the reactor meltdown and the human factors in relation to both the causes and outcomes: dysfunctional behavior, lack of safety culture and breakdown of organisational order.

These types of "amplifiers" provoke a powerful affect heuristic, such that stakeholders are unlikely to be pacified with soothing or reassuring rhetoric is from a stakeholder affiliated to "The Bomb Surf Petition". The metaphor in this label, indicates conflation between nuclear weapons and nuclear energy, by which a similar "bundle of attributes" is allocated to either use of technology (Slovic, 2013:108). This stakeholder comment offers a different perspective of loss that is more nature orientated compared to the previous. Here the emotion and value-based concerns of the lay-person, is juxtaposed with the formality of the response.

**Stakeholder comment** (EIA:12/12/20/944:V1:02.2016:*9-10*):

Has no one learned from the disaster in Japan?? Oh yes right, it was a month ago, forgotten already! Or is that South Africa's technologies are so much more advanced than Japan's? … oh yes, right, earthquakes and tsunamis won't happen in Cape Town. That is what the Japanese also said (at least of that scale). But they were wrong!

But money and success comes before the health of the people and the environment.

One question: imagine Cape Town in all its glorious beauty, with its blue skies and gorgeous beaches, totally empty, no people, no animals, no plants, no life whatsoever on land or in the water….and dead, poisonous beauty… How tragic that would be. It is the reality of Chernobyl!

With every Nuclear Power Station, the possibility of that outcome gets bigger and bigger. I hope I never have to say "i (sic) told you so" but can you take the responsibility and say "yes let's risk everything?"

I can't!

**Response** (EIA:12/12/20/944:V1:02.2016:*9-10*):

There are inherent dangers in nuclear technology (as with many other forms of technology) but if these are responsibly managed the risk to the public is negligible. The release of radioactivity from the Fukushima Daiichi plant is a regrettable incident that could have been avoided with proper planning.

The stakeholder's comment is dramatic and evocative, epitomising a citation in Alexander (2018:199) by O'Neill (1972) describing how "ecology is linked to the psychic economy of the individual". As the discussion of Roeser's work in Chapter 4 indicates, emotions are on the one hand, a type of strategy. Notwithstanding this intent, feeling can also be 'truth apt' (Roeser, 2017).

What was uncovered in the exposé of the "nuclear deal", is that the "money" this stakeholder refers to, was a factor for elected officials in respect of the nuclear proposal, driving the corruption that took place. Also relevant in respect of 'truth' is the reference to "proper planning" in the response. Following Fukushima, the Japanese

government commissioned an independent investigation into what led to the meltdown. The following excerpt from the Commission's report highlights both culture and psychological influences as root causes:

> *What must be admitted – very painfully – is that this was a disaster 'Made in Japan'. Its fundamental causes are to be found in the ingrained conventions of Japanese culture: our reflexive obedience; our reluctance to question authority; our devotion to 'sticking with the programme'; our groupism and our insularity* (Independent Commission of Investigation, 2012:9)

Whilst the majority of stakeholders who commented on the nuclear proposal drew on at least some aspect of precedents to substantiate their fears, there were some that offered simple emotional pleas, for example this contribution by a local resident.

> **Stakeholder comment** (EIA:12/12/20/944:V1:02.2016:*17*):
>
> This is totally ridiculous please stop killing us
>
> **Response** (EIA:12/12/20/944:V1:02.2016:*17*):
>
> Thank you. Your comment is noted.

The stakeholder's entreaty is confounding in this context because it is so foreign in the rational scientific order of discourse befitting to the EIA. Limitations on what is acceptable compels the consultants to treat the comment as intellectually vacuous, and it is dismissed. In this respect Connelly and Richardson (2005:396) refer to the logic of instrumental rationality tending to necessarily "ignore and exclude values which are irreducible and so incommensurable". Arguably, the word "noted" is useful to discharge such comments, to which there simply is no rational response, or as Hajer (1995:57) suggests - "not what should be said" on "this sort of occasion". Consequently, boundaries are created between what is included and what is not. In the previous example, I referred to semantic engineering which is also appropriate in this instance, as the respondents attempt to reign in emotion, and maintain "terminological control" (Alexander, 2018:199).

Other responses to stakeholder concerns about the dangers associated with nuclear energy refer to 'false' perceptions linked to cancer, negative precedents and so forth. A public stakeholder and 'green' architect, resident in Cape Town, expresses annoyance about how the EAPs have framed these concerns:

> **Stakeholder comment**: (EIA:12/12/20/944:V2:02.2016:*350*)
>
> There is a bias to be found in parts of Nuclear-1 EIA… that implies that the major disadvantage or challenge of nuclear power is "public perception". As a member of the public who has studied these documents and found numerous fault lines as indicated in my comments, I take exception to the implication that it is my 'perceptions' that is the greatest challenge rather than the issues and problems that I raise.

This comment speaks directly to the divide that critics of the psychometric paradigm have highlighted. The consultants reinforce the distinction between perception and expert knowledge by responding to this, and several other similarly framed concerns, by making comparisons. They focus particularly on juxtaposing the dangers of nuclear power with "common" risks, argued to have a far greater potential "to lead to fatalities or serious and debilitating injuries" that the public is "happy to accept on a daily basis" (EIA:12/12/20/944:V2: 02.2016:361). The example of "travelling in vehicles" is used responses by the consultants, whereby they point out that "more than 16,000 South African's are killed on our roads each year (EIA:12/12/20/944:V2: 02.2016:361).

In one of the in-depth interviews I conducted, the difference between acceptable and tolerable risk was discussed, with the interviewee stating as follows:

> Every one of us deals with tolerable risk. It might not be risk that we want in our lives, it might not be an acceptable risk in our lives, but we tolerate it because we have no choice…we simplify it in our mind's eye and we say, well, we'll be okay doing that (IR1:15.03.2021).

In developing appropriate communication strategies, particularly around low probability - high consequence risks, Covello and Sandman (2001) advise against comparisons, as does the United States' EPA guideline in its list of 'rules' for risk communication. Accordingly, comparisons tend to miss what actually matters to

stakeholders, and can also backfire – "even when they are created in good faith by people that find them eminently sensible" (Fischhoff, 2012:214). Analogies between 'imposed' risks and either 'natural' or 'voluntary' risks are particularly ill-advised, because they tend to convey a message that stakeholders are incapable of understanding what is good for them. In this respect Douglas (1992) opines as follows:

> *Warm blooded, passionate, inherently social beings though we think we are, humans are presented in this context as hedonic calculators calmly seeking to pursue private interests, We are said to be risk-averse, but, alas, so inefficient in handling information that we are unintentional risk takers; basically we are fools* (Douglas, 1992:3).

Comparisons can also be interpreted differently from alternate perspectives. In the impact assessment chapter of the EIR, the consultants compare the risk of a nuclear accident with skydiving:

> Risk is defined as the consequence (implication) of an event multiplied by the probability (likelihood) of that event. Many risks are accepted or tolerated on a daily basis because even if the consequence of the event is serious, the likelihood that the event will occur is low. A practical example is the consequence of a parachute not opening, is potentially death but the likelihood of such an event happening is so low that parachutists are prepared to take that risk and hurl themselves out of an airplane. The risk is low because the likelihood of the consequence is low even if the consequence is potentially severe. Various contingencies are provided to minimise the likelihood of the consequence (serious injury or death) in the event of the parachute not opening, such as a reserve parachute (EIA:12/12/20/944:02.2016:10-15).

The difficulty with this analogy lies in the fact that very few people do "hurl themselves out of an airplane" irrespective of the contingency measures and the statistics. Here voluntary risks are not distinguished from imposed risk. The metaphor is a kind of euphemism intended at moderating the potential harm. Counter to the intention of the EAPs, this comparison can also be used to demonstrate why nuclear energy is a generally unpopular choice of technology, used in only 15% of countries worldwide. What the psychometric paradigm aims to elucidate, is how few people would be persuaded to skydive *irrespective* of probabilities. Similarly, few are likely to

be convinced - on the basis of low probability and contingency measures – that nuclear power is safe. As one of my interviewees points out:

> …as practitioners, we gloss over that risk by immediately saying, oh no no…the probability of that is so small, the likelihood of that is so small that we don't properly acknowledge or recognise that concern that is held by that person (IR1:15.03.2021).

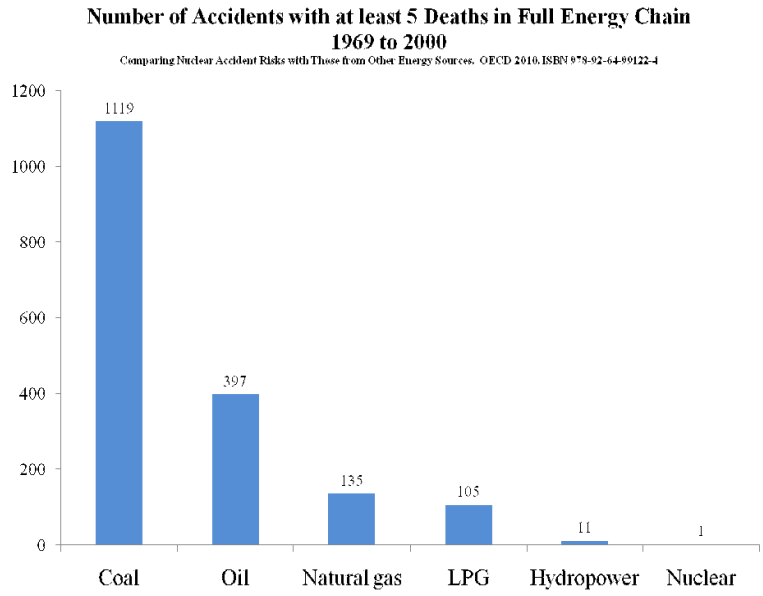
Another stakeholder makes the following point that speaks to the existence of danger coupled with a lack of trust in South Africa's institutional ability to respond:

> **Stakeholder comment**: (EIA:12/12/20/944:V2:02.2016:*350*):
>
> Three of the leading atomic power producers and technological leaders in the world have had serious problems, which they could not control. These disasters in America, Russia and Japan could not be prevented, nor did the countries have too much idea on how to control the damage. There is no way South Africa has the ability to deal with a disaster of this magnitude

The response aims to normalise the possibility of an accident in relation to the wider industrial and manufacturing sector, and point to the role for insurance:

> **Response** (EIA:12/12/20/944:V1:02.2016:*17*):
>
> To put this into context, accidents or incidence do happen across all industries and manufacturing sectors. The following graph shows the number of accidents from various energy sources (comparative graph). Hence, like any organisation or property owner, Eskom is obliged to obtained (sic) insurance over its assets to cover any potential incident of damage

The graph to which this response refers is copied below. It is intended to demonstrate the relative safety of nuclear power. Here safety is statistically represented and defined in terms of death and injury.




This graph is frequently referenced in the Comments and Response report. Fischhoff's (2012) observation is apt in this regard:

> *When risk managers discover that have not been trusted to do their work in private, a natural response is to hand over the numbers…There is something touching and forthright about such a straight forward delivery. However, it is likely to be seen, perhaps accurately, as reflecting the distance between the analysts and the audience* (Fischhoff, 2012:139).

The frequency with which the graph is referred to, suggests that the success of the engagement for the EAPs hinges on convincing the public about the unlikelihood of negative outcomes. Stakeholders, on the other hand, see what is missing in the statistical representation of accidents – the human dimension, the incomprehensible levels of harm and distress that they have access to via other information conduits. Hence the merit of alternative theory - the concept of exceptionalism, affect heuristic and the psychometric framing of nuclear technology as the essential example of low-probability, high-consequence.

Also in respect of this comment, the stakeholder's concern is not insurance related, as the response suggest, it is about the institutional capacity to respond to harm. In a review of consequences, and associated lessons, from the Chernobyl meltdown, Liberatore (2013:63) tells her readers that "it will also be stressed that the Soviet

authorities (just as the authorities in all other countries) were unprepared to cope with a nuclear disaster whose chance of occurring had been underestimated; consequently, serious difficulties were faced in dealing with the burning reactor and in quickly organizing massive evacuations". One of the most startling facts pointing to a lack of understanding of consequences was that a decision to evacuate an additional 200 000 people from the area was made four years after the event (Liberatore, 2013).

Conflicting comment and responses, in relation to precedents of disaster, concentrate on the fine line between prudent concern and crippling fear, but what they also highlight are also the questions that Beck (2006), poses in respect of this line:

> *Who defines it? Scientists, whose findings often contradict each other? Can we believe the politicians and the mass media, when the former declare there are no risks, while the latter dramatise the risks in order to maintain circulations and viewing figures?* (Beck, 2006:345)

What is clear in respect of the potential for harm is that contrasting readings of past events inform the social construction of risk in present-day circumstances. Alternate meanings of risk contribute to polemic positions, which in turn, impinge on the engagement process in respect of its openness and transparency.

*Theme 2: "Because there is a Bridge" - considering the alternatives*

The issue of alternatives has been a contentious aspect of IA in South Africa for many years (Gerber, 2009; Retief, 2011; Wood, 1999). This is because the way in which the IA system is set up, does not lend itself to considering alternatives, even though the legislation requires this step in the process. As explained in the description of how EIA works in South Africa, the developer approaches the EAP with a specific intent and a particular project in mind. They then become 'the client' in a contractual arrangement with the consultant/s, and their proposal becomes 'the project'.

In acknowledgement of the 'alternatives' dilemma (see Gerber, 2009), the EIA Regulations requires EAPs to consider a range of options, but also leave scope for what can be defined as an alternative. According to the Regulation 1 of the EIA Regulations of 2014, alternatives can relate to the type of activity, the technology to be used, the

design, the layout, operational aspects and/or the location for the activity. It can be appreciated from this description that the presentation of alternatives can be at any scale or level of detail, such that the options presented in the resultant EIA report are often quite arbitrary, or contrived to present the developer's preferred alternative as the obvious best choice. In this respect, Steinemann (2000:3) points to how in IA "alternatives often reflect narrow project objectives, agency agendas, and predilection toward a proposed action". Inevitably, controversy is fuelled by stakeholder apprehensions that the alternatives have been selected in a manner that prioritises the financial interests of the developer over the imposition of risks on the community or the natural environment.

In respect of the Nuclear-1 EIA, the EAPs relied on the government's IRP to confine the consideration of alternatives to the siting of the power station at one of three localities in the Western Cape (EIA:12/12/20/944:02.2016:1-1).

- Duynefontein: adjacent to the existing Koeberg reactors, situated approximately 35 km north of Cape Town
- Bantamsklip: on a vacant purposefully acquired by Eskom, on the southern Cape coast near Gansbaai
- Thuyspunt: also an Eskom-owned property with a few houses on it, situated between the coastal towns of St Francis and Oyster Bay, east of Bantamsklip.

According to the section of the EIA that deals with "need and desirability", factors relating to alternatives, other than where the plant would be sited, were already mooted by higher orders of decision-making, reflected in government policy. In this case the IRP of 2010 (Department of Energy, 2019), designates a proportion of electricity supply to be generated from nuclear fission. Hence the EIA states as follows:

> The approach used in this EIA has been one of defining the need and desirability for the project as a function of the nationally developed IRP (Integrated Resource Plan) and must remain so. An EIA is by definition project-specific and thus cannot objectively present an assessment of national policy dictates such as the IRP and even less so potentially usurp the requirements of that policy. What cannot be disputed in the EIA, however, is that there has been a significant reduction in demand for electricity since

> the publication of the 2010 IRP… stakeholders have highlighted, if the demand is less than what was projected, then the proposed timing of supply options and energy mix may change. However as there is no formally published revision to the 2010 IRP that can be used to revise this report, the need and desirability for the project remains rooted in the 2010 IRP (EIA:12/12/20/944:02.2016:4-2).

This situation is reminiscent of O'Brien's (2000) analogy to there being a bridge, cited in Chapter 3 and alluded to in the heading of this section. In the analogy the expert advisors eschew the existence of alternatives because the 'brief' is narrowly focused on a particular option. The message that the EIA cannot "usurp the requirements" of the IRP suggests to stakeholders that the nuclear option is *fait accompli* for reasons primarily to do with the incontrovertible "needs and desires" of the political policy-makers. This viewpoint is reflected in the following comment:

> We would like to place on record that we object to statements made by senior Eskom officials at a recent public meeting held in St Francis to the effect that the "development is going ahead no matter what". This statement clearly indicates that officials in Eskom are of the opinion that the EIA is nothing more than a rubber stamp (EIA:12/12/20/944:02.2016:4-2).

Arguably, there is a step missing between the policy formulation and the site selection process, such that should have been fulfilled by a different tool – a SEA, a technology or alternatives assessment. The leap from a broad energy source allocation policy (with the ambiguous title of "Integrated Resource Plan") to a detailed site assessment for a nuclear power station, makes it more likely that stakeholders will feel unfairly treated and excluded from key decisions from the outset. Evidence for this is provided by court papers filed, in July 2020, against the Minister of Mineral Resource and Energy, by the NGO (GroundWork), challenging the decision-making process that led to the energy source allocations presented in the latest IRP.

The concern over alternatives is reflected in over 800 remarks in the Comments and Response report. The following contribution from a farmer close to one of the proposed sites in Gordan's Bay, highlights the disconnect between high-level government policy documents, and concerns of everyday life.

**Stakeholder comment** (EIA:12/12/20/944:V3:02.2016:*80*)

This seems to be another ideal opportunity to enrich another class of "tenderpreneurs"! No matter what we say, or what evidence we produce there is always some specialist to counter our claims! We have lost all faith in the integrity and honesty of Eskom and its contractors. As farmers we are struggling to survive in difficult economic times, how much more difficult will it be with contaminated product? Do you honestly believe that this is the future solution? We live in a windy, sunny area where there are many alternatives to conventional energy sources.

The farmer is one among many stakeholders who point out that weather conditions at each of the proposed localities for the power station would be suited to either wind or solar energy production. Several stakeholders also challenge Eskom's argument that supply from renewables would be unable to provide sufficient "base load", as flawed. In response, the EAPs offer the following:

**Response** (EIA:12/12/20/944:V3:02.2016:*388*)

A debate on the merits of nuclear power generation vs. other forms of electricity generation (e.g. renewables) is outside the scope of a project-specific EIA process like the EIA process for Nuclear-1 (however please refer to Chapter 5 of the EIR for a strategic discussion on alternative power generation technologies). It will therefore have to be accepted that some I&APs will always remain opposed to the Nuclear-1 project as a matter of principle. However, in spite of such constraints, the EIA process has facilitated redesign of some project components, optimisation of some positive impacts and mitigation of many negative impacts, such that the net negative impact has been greatly reduced and the net positive impact has been enhanced. Greater acceptance of the proposed project may be achieved through this process.

What is evident in the above, is the respondent's wont to position the stakeholders in a manner that enables them to understand the project from a particular perspective – a power game in which the opposite bids is seen and raised. Consequently, it is expected that stakeholders will accept the offer of "net positive impact" over less "net negative impact" despite what that means for those in the immediate vicinity. As

Alexander (2018) points out, in a neo-liberal capitalist world, things happen to regions and inhabitants of those regions over which they have no control.

The term "outside the scope" in the second line of the response is repeated in respect of several topics that are integral to the proposal and important to the stakeholders. These include issues around nuclear waste and uranium mining. As one of my interviewees points out, "out of scope" is one way to avoid the more ethically challenging questions so as to ensure that "everything always turns out swimmingly" (IR 1:15.03.2021).

Notwithstanding the narrow terms of reference for the assessment cited by the respondents, as the controversy intensifies, they are drawn to engage on topics that they previously defined as beyond their brief. An example in relation to mining of uranium reads as follows:

> **Response** (EIA:12/12/20/944:V3:02.2016:*371*)
>
> It is true that nuclear generation results in uranium mining impacts. However, the same is true for any other technologies, including renewable technologies like solar and wind generation. Raw materials for solar panels and wind turbines and their associated infrastructure are also obtained through extractive and destructive processes, including mining. Silicon for solar panels is obtained from soil, which is mined. Iron and other metals required for the construction of wind turbine towers is also mined…Renewable technologies are not free of environmental impacts over their life cycles. However, a life-cycle impact assessment is not possible within the constraints of a project-specific EIA process.

This response is another retaliative response – a power game 'at which two can play'. Facts are offered as substitutes for tackling what Wynne (2002:472) refers to as "proper human purposes and conditions". Fundamental issues bearing on the integrity of the proposal, are countered with more and more information, in a moderated tone which is aimed "channeling tolerance" (Alexander, 2018:200). Another comment that reflects this tendency is the following, in response to release of the final report:

**Stakeholder comment** (EIA:12/12/20/944:V3:02.2016:*13*):

The majority of the studies have not changed and most of our concerns were not addressed. The current report is still riddled with uncertainties, areas not covered and vague references.

**Response** (EIA:12/12/20/944:V3:02.2016:*13*):

All specialists were comprehensively informed of the revised impact assessment methodology prior to revision of their reports for the Revised Draft EIR. All specialists were consulted prior to finalisation of the assessment criteria to ensure agreement regarding the definition of the criteria, and teleconferences were additionally held with all the specialists to ensure their understanding of the criteria once revision of the criteria was completed.

Faced with the allegation of disorder and uncertainty, the response falls back on Beck's (2006:333) "relations of definition", indicative of what Hajer and Versteeg (2005:180) describe as "the modern deployment of power". Depicted is a network of specialists with access to instrumental knowledge and an ability to frame issues according to expertly defined criteria within the prescribed policy framework. Unfortunately, whilst these criteria may be adequate for addressing potential harms, they fall short in relation to value-based concerns that stakeholders have raised - where the money is coming from, how the facility will be maintained, who stands benefit, and where is the indisputable evidence of a need to prioritise a nuclear power station over other options?

This brings me to the final theme in respect of the descriptive dimension for the nuclear power plant example, which focuses on values - including trust, ethics and morals.

*Theme 3: Trust, ethics and the moral dimension*

During the course of the EIA, a number of concerns were raised relating to trust, ethics and the moral dimensions of the nuclear proposal. Many accusations of bias were linked to the contractual relationship between the consultants and their client (Eskom). An example reads as follows:

**Stakeholder comment** (EIA:12/12/20/944:V3:02.2016:*15*):

We would like to state that the fact that Eskom is paying for the EIA does not allow them to manipulate the process. The fact that the developer is responsible for appointing consultants to conduct an EIA is part of the NEMA and the whole notion that this allows the developer to have more say in the process than the I&APs should not be allowed. The consultants are responsible to keep the process independent. We do not believe that this is the case in this EIA. We are of the opinion that Eskom, as the developer, is too integrated into the EIA team and that the consultants have therefore lost control of the process.

**Response** (EIA:12/12/20/944:V3:02.2016:*15)*:

We take note of your comments. It is within Eskom's rights as applicant to say what alternatives it prefers, as it is *within the rights of all I&APs* to say what alternatives they prefer. All applicants are involved in the EIA process, as it is *by its very nature* a process in which there is a *constant flow* of information between the applicant, the EAP and I&APs. Environmental recommendations for Nuclear 1 are based on the *merits of the case.*

The EIA is definitely a serious process; hence the duration of this current EIA running up to approximately 9 years which is indicative of the effort and time Eskom invested in this project to ensure extensive and constructive consultation.

Whilst the first part of this response speaks to the fairness of the process, the inference that stakeholders and Eskom are equal partners in the debate is fallacious. This response is replete with "purr" words and phrases, previously explained and which I have italicised in this response. The last sentence is problematic in its reference to the "merits" of the case, presuming there are no de-merits. The second part of the response further compromises the independent stance of the EAPs by referring to Eskom's investment in "effort" and "time". This type of "corporate-friendly" rhetoric (Alexander, 2018:200), does not acknowledge endeavour on the part of public stakeholders. I&APs have no financial interest in the project but are, nevertheless, motivated to protect what is valuable to them. Consequently, they also have strategies. The comment copied above was part of a 14-page response, and one

amongst numerous comprehensive submissions on behalf of the Thuyspunt Alliance, a dedicated branch of the St Francis Bay Ratepayers Association set up to engage with the EIA.

In their account of risk perception regards radiation, Blastland and Spiegelhalter (2014) have highlighted how there is often error, but also wisdom in public attitudes and opinions towards nuclear energy, aligned to Roeser's (2017) perspective of a role for emotions. In this respect, one of the interviewees highlights the consequences of viewing stakeholders as "passive receivers of information" (IR2:19.03.2021) rather than co-creators of knowledge. Despite lacking certain factual information about radiation hazards, the public conceptualisation of risk "can be much richer than some experts", reflecting legitimate concerns that are typically omitted from specialist assessments (Blastland & Spiegelhalter, 2014; Löfstedt, 2008; Wynne, 1996). In the comments and response report, a stakeholder affiliated with the Hermanus Ratepayers Association opines as follows (caps in the original):

> **Stakeholder comment** (EIA:12/12/20/944:V3:02.2016:*179*):
>
> From a macro-economic perspective, however, it is our considered opinion that the pursuit of a nuclear energy path would serve to bankrupt the fiscus and would not be in the best interests of the ecology or country as a whole.
>
> WE RATHER PERCEIVE THE POTENTIAL FOR A MASSIVE TRANSFER OF WEALTH FROM THE SOUTH AFRICAN PEOPLE TO THE G8 COUNTRIES AND POSSIBLY CHINA AND THE CONCOMITANT OPPORTUNITIES FOR LARGE-SCALE CORRUPTION AND THE ABUSE OF PARASTATAL AND STATE POWER.

In retrospect this stakeholder's fears not were not unfounded - except that Russia was the potential beneficiary rather than China, along with kickbacks for the President and members of his family. Reflected in the response, is a struggle on the part of the consultants to find coherence, and retain an authoritative stance in defence of Eskom's approach:

**Response** (EIA:12/12/20/944:V3:02.2016:*180*):

> There have indeed been significant cost overruns on construction of nuclear power stations. However, it must be borne in mind that the Finland site (Olkiluoto) was the first site where the new European Pressurised Reactor (EPR) unit was constructed. The French site (Flamanville) was the second and a considerable number of lessons learnt at Olkiluoto were implemented at Flamanville hence much reduced delays were experienced. The Chinese plants used these lessons and are on time and within cost. Eskom has never intended to build a first of a kind plant type, which will reduce the risk of overruns in both construction time and cost.

The source of reassurance for the stakeholders in this instance is that Eskom is intending to purchase an 'off-the-shelf' nuclear reactor, the design and construction of which has been mastered elsewhere. Speaking to the presumption of trust in this response, a stakeholder representing the Koeberg Public Safety Information Forum asserts as follows:

**Stakeholder comment** (EIA:12/12/20/944:V2:02.2016:*32*):

> One cannot assume that the claims of reactor manufacturers or claims of current operators and proponents of the industry, are accurate. This necessitates a study done outside of the confines of the NNR, Eskom, NECSA environment.

The consultants respond defensively to this statement suggesting that "it is not helpful and without basis to distrust the NNR, Eskom and NECSA" (EIA:12/12/20/944:V2: 02.2016:32).

Notwithstanding this patent commitment to protecting the interest of their client, given the link between the EIA and the 'nuclear deal', it was inevitable that the EAPs' position would become increasingly precarious. In the face of mounting suspicion and uncertainty about the motives for the nuclear project, their tactic was to immerse their responses thoroughly in the language of science. In line with Hajer and Versteeg's (2005) definition of discourse (see Chapter 3), their replies to comments were "produced, and reproduced", embellished with additional details and 'evidence'.

Among the external stakeholders were retired and active scientists, commissioners and other independent 'specialists' who also supported their counter-arguments with published findings, alternative models of risk, and citations from a range of sources. One exasperated response from the EAPs, redressing the Chair of the Koeberg Public Safety Information Forum comment on discrepancies in findings from two expert bodies in relation to the effects of Chernobyl, reads as follows:

> **EAP response** (EIA:12/12/20/944:V2: 02.2016:29).
>
> Cannot comment without reviewing the methodologies followed respectively by WHO and UCS. Nevertheless, this EIR does not deal with nuclear accidents…will this become a ping pong game where various research materials are countered against each other?

What this shows is how the "research", normally relied on to resolve uncertainty, is selectively mobilised by either party and used as ammunition to defend their alternative views. No doubt the EAPs are aware of their being complicit in the "ping pong game" but appear unable to step out of the fray. One of the interviewees with whom I discussed the psychological dimension, agrees with what Wynne (2002) describes as the "constitutive habit" among professionals to adhere to a realist definition of risk:

> …practitioners haven't learnt, they are still doing the same things over and over again…our commitment for risk assessment needs to incorporate a multitude of perceptions of risk, so unless we incorporate – and this is very difficult to do – values of those who are at the receiving end of risk…that value is never analysed in the same way as the scientists or the EAP's analysis of risk. Practitioners are very much technocrats in that way. Even though they might talk about risk without fully understanding how risk is perceived, how it is felt, the psychological impact of risk, the emotional response to risk. If we don't bring that language, that understanding into our assessments, then there will still be a very strong divergence between what we communicate and what is perceived by IAPs (IR2:15.03.2021).

The marginalisation of certain types of knowledge, or a lack of knowledge, is further demonstrated in the following exchange between the EAPs and the National Chair of the Coalition Against Nuclear Energy:

**Stakeholder comment** (EIA:12/12/20/944:V3:02.2016:148):

As Nobel Prize-winning chemist Hannes Alfven put it, we cannot determine the exact effect of man-made radioactivity on the environment because we do not have enough experience over such a long period of time. To speak of background radioactivity, then, is a complete and dangerous obfuscation, designed to lull us into a false sense of security or to engineer out "perceptions" not by lying but by making us look in the wrong direction for the truth.

**Response** (EIA:12/12/20/944:V3:02.2016:149):

Should you have a body of verifiable and peer reviewed scientific evidence to support your claim that background radiation does not exist, kindly supply this. Reference to background radiation is in no way meant to divert attention from the risks of nuclear waste. However, there is a commonly held and incorrect perception (unsupported by academic and scientific literature on radiation) that human-made radiation is the only radiation that exists and that no natural radiation existed prior to the advent of nuclear science.

The word "kindly" is used often (35 times), particularly in responses from the consultants to stakeholders asking them to back their views with supporting "scientific evidence". This geniality belies the consultants' frustration and determination to cling to a firm basis on which to refute contrary research. A patronising tone is evident in responses to stakeholders who do not adhere to the respondents' stance on the type of scientific knowledge that is appropriate in the context of the EIA. This is demonstrated in the reply to concerns raised by the South African Commission for Gender Equality:

**Response** (EIA:12/12/20/944:V2:02.2016:195):

As an organ of government, the Commission for Gender Equality has a responsibility to base its opinions on peer reviewed, objective scientific data. Some of the above-mentioned websites, however, provides no scientifically verifiable facts to support its claims and is based largely on the opinion of the authors.

There are numerous other examples, particularly in the final stages of the participation programme, which show how the debate boils down to a 'war of words', that falls short of consultation, much less participation. Also apparent, are the attempts by many of the stakeholders to acquire the scientific language of risk, with the intention to 'level' the discourse playing field. The difficulty in these situations is that the availability of information in the public domain creates what is referred to as the typical science-policy dilemma (Sarewitz, 2004:83)- experts on either side of an issue effectively cancel each other out, rendering the scientific arguments moot. This then widens the gap for contestation over political interests and moral issues.

Reflected in this third theme for the case study, is a struggle to isolate the IA from proximal issues in the political and policy milieu. Perceptions about fairness, trust and truth are pitted against what is, in essence, a semblance of scientific objectivity and ascription to legislative, policy and procedural norms. One of the interviewees describes a tendency in the discipline to reduce probability as the "Harry Potter" effect:

> This is complete nonsense. Some impacts ought to remain high – there are instances where risk must be tolerated for society at large to enjoy the benefit. You are then just legitimising the project by artificially lowering the risk when it is nothing of the sort. I have seen an instance where EAPs describe the visual impact of a 4.7 km viaduct which start off with a high rating and then is transformed to low with 'mitigation'. How is that possible? I call this the "Harry Potter" effect. (IRP1:15.03.2021)

Unfortunately, in Nuclear-1 assessment, amidst the rhetoric and contestation the moral compass for the EIA is lost. In this regard Sarewitz (2000) notes that:

> *Arguing about science is a relatively risk-free business; in fact, one can simply mobilise the appropriate expert to do the talking and hide behind the assertion of objectivity. But talking openly about values is much more dangerous because it reveals what is truly at stake…the value-laden issues that the science conceals* (Sarewitz, 2000:91).

The Comments and Response report shows that scientific arguments in support of nuclear power could never convince in the face of unscrupulous intent: the realist risk discourse becomes increasingly less stable as it comes into contact with other social-

constructivist discourses which are less factual in many instances, but more inclined towards 'truth'. Notwithstanding the sincere conviction of the IA practitioners and dedication to the process, the scientific argument could not withstand the human dimension: the underlying politics and corrupt intentions on the part the highest level of government.

## Summary of findings

Psychological theory, and the associated psychometric paradigm, primarily seeks to explain why comparable risks of exposure can either induce feelings of outrage, or be accepted as a normal part of life. Whilst the theory is supported by many good examples, as indicated in Chapter 4, the 'science' of risk perception comes with the temptation in the context of IA, to frame inexpert opinion as value-laden, emotionally driven or irrational. Challenges for the IA discipline reflected in the Nuclear-1 EIA, stemmed from an authentic belief in the ability of the science - a conviction that a thorough explanation of the facts would convince stakeholders that the nuclear proposal was "a good deal for them" (Fischhoff, 2012:209). The result is a conflation of the pedagogical function of risk communication, and the participatory aims of stakeholder engagement.

What is highlighted in this case is a commitment to the reification of risk according to its realist interpretation - the transformation of possibilities into facts (something that exists in real form). What the discourse analysis shows is how stakeholders are more concerned about the truths that sit behind the facts. Underscored is how the IA discipline's unwavering commitment to the science of risk, constrains their engagement with stakeholders and inhibits the sharing of knowledge. Positioned on either side of an expert - lay person divide, practitioners and public stakeholders become locked in what Hajer (1995:287) describes as "antagonistic discursive formats". This is evident in each of the three themes I have identified in the Comments and Response report.

The first theme, relating to precedents for nuclear accidents, shows how prior events, such as Fukushima and Chernobyl, become emblems - issues that stand out in a

particular period and "dominate public and political attention" (Hajer, 1995:4). Whilst the symbolic status of these occurrences is relied on by stakeholders to demonstrate the worst forms of danger nuclear technology poses to society, the respondents mistakenly treat associated arguments as 'low-hanging fruit', easy to counter with statistics and comparative graphs, highlighting low probabilities.

The second theme revolves around strategic alternatives. In justifying the focus on nuclear, practitioners rely on the policy document, the Department of Energy's Integrated Resource Plan (IRP), to refute suggestions that this source of energy may not be an appropriate solution to South Africa's energy crises. In this interpretation of the policy, the need for nuclear is framed as a *fait accompli* from the perspective of stakeholders. Notwithstanding the constraints imposed by the IRP on the scope of the EIA, it is evident in the comments and responses that the consultants were drawn into arguments over nuclear *versus* other options. What the discourse analysis reveals is a compulsion on the part of the respondents to defend the nuclear proposal, lest the fundamental premise of the EIA be compromised. A key part of their strategy rests on convincing the public of the safety of nuclear energy, compared to other alternatives, including renewables. Their confidence stems from the neat fit between this argument and the statistical data behind the realist formulation of risk.

The final theme in the descriptive dimension of the analysis focuses on the moral aspects of the project. Many of the stakeholder comments deal with issues of trust and uncertainty, including the ability of the EAPs to offer an impartial assessment, given that they are being paid by the project proponent. As indicated in the extracts from the report, there are persuasive words and phrases that an indicate allegiance on the part of the practitioner to their client, giving credence to Beck's notion of "relations of definition" in risk society theory (Beck, 1992). These include phrases such as "Eskom is committed to this project"; "within Eskom's right"; "It is not helpful and without basis to distrust Eskom"; "Eskom is committed to building nuclear installations with enhanced safety design features compared to the majority of reactors operating currently in the world". Consequently, both the EIA and Comments and Response report reads, in places, more like a public relations campaign than a balanced assessment and evaluation of risks and impacts. Also related to this theme is the less

obvious and more insidious danger that lurked in the politics behind the "nuclear deal". In this respect Roeser's (2006:689) contention bears out - that emotional responses are an "indispensable normative guide in judging the moral acceptability of technological risks".

Accounting for the three dimensions of discourse, the analysis shows that instead of deploying the insights of the psychometric paradigm in nuanced and reflexive ways, the scientific data is mobilised in a concerted pedagogical effort – drawing on comparisons, statistical graphs and analogies to tutor stakeholders toward accepting the nuclear energy proposition. In describing how knowledge brokering should work, Partidario and Sheate (2013:27) stress that "knowledge is not something that can be simply given by an expert to a group of stakeholders". The reactive nature of such pedagogical approaches makes them less participative, and more conducive to holding onto power than sharing thereof.

As the EIA proceeded over nine years, arguments in support of the nuclear proposal and Eskom's role therein, became increasingly difficult for stakeholders to countenance, and for the practitioners to uphold. Highlighted in the explanatory dimension, is how Eskom's involvement in a web of corrupt financial transactions and State Capture was steadily being exposed, as were major cost overruns and design faults in their two newly built coal power stations. In respect of the nuclear proposition, Hajer's (1995) observation in his analysis of the acid rain controversy, bears relevance:

> *Hard decision-making on…environmental problems requires an almost unprecedented degree of trust in experts and in our political elites at the same time as this trust is continually undermined by scientific controversies and political indecision* (Hajer, 1995:11).

What is exemplified by the Nuclear-1 EIA is that "the science" can only ever offer "part of the picture" (Jasanoff, 2007:33). In the end, it was the judiciary that had to compensate for what was missing. The court became the conduit for the 'values' component of the proposal. Social change is, in the end, effected by the Judgement on the "nuclear deal", which uncovered the nefarious intentions of the highest political office, justifying a lack of trust and reservations about the project that many

stakeholders expressed during the EIA. Under these circumstances, it is understandable that the boundary between rationality and hysteria becomes blurred – practitioners are in a position where they feel compelled to "proclaim a security" which they cannot guarantee (Beck, 2006). All parties are at some level aware of this predicament. Thus, whilst the science behind the risks associated with the nuclear alternative is generally credible, in this instance it fails to convince in the face of profound moral defects of those in power.

# Chapter 8

# Case study: Hydrofracking for shale gas in the Karoo

The third case study unpacks the debate concerning hydrofracking for shale gas in the Karoo and the ensuing Strategic Environmental Assessment (SEA). With this final case I continue to focus on my third research question, looking at competing constructions of risk via the lens of cultural theory and exploring its relevance to stakeholder values and power dynamics. I begin with an outline of SEA in South Africa, followed by the background to the project. I then adopt the lens of cultural theory in a discourse analysis of the hydrofracking debate generally, and more specifically in relation to how risk is framed in textual extracts from the SEA Report. As indicated in the Methodology (Chapter 5), in this case I have relied primarily on the Summary for Policy Makers for the descriptive dimension of the analysis (SEA:970-0-7988-5631-7:11.2016). What the findings demonstrate, by example of the SEA, is the influence of solidarities aligned to diverging worldviews, and the inadvertent bias toward the hierarchy embedded in scientific language to do with risk.

## The Strategic Environmental Assessment

In the previous chapter, I highlighted some of the challenges associated with a strictly legislated project-specific approach to EIA in South Africa. A key distinguishing feature of the SEA in South Africa, compared to EIA, is its wider reach, covering environmental risks stemming from policies, plans and programmes (DEAT, 2007). Other features that differentiate between the two tools have been described by, among others, Bina (2008), Dalal-Clayton and Sadler (2005), Fischer (2003), Therivel (2004). As evident in the comparison provided in Table 8, potential advantages of a more strategic approach include the identification of key environmental constraints, thresholds and limits early in the decision process; and ensuring that strategic actions do not exceed limits beyond which irreversible damage from impacts may occur. The aim of the SEA is, therefore, to promote the most "environmentally benign" solutions at early stages of planning, policy and programme development (Emmelin, 2006:14).

Table 8: The aims and characteristics of EIA and SEA (based on DEAT, 2007)

| Environmental Impact Assessment (EIA) | Strategic Environmental Assessment (SEA) |
|---|---|
| Tends to be reactive to a proposal for development project – 'technical' instrument | Is pro-active and informs development policies, plans and programmes – 'political' instrument |
| Considers the impacts and benefits of a proposed development project on the environment and socio-economic conditions | Considers the effect of the existing environmental and socio-economic conditions on development opportunities and constraints |
| Relates to a specific project | Relates to areas, regions or sectors of development (programmes, policies and plans) |
| Has a well-defined beginning and end, with a view to informing a decision at a point in time | Aimed at the development of a sustainability framework to inform continuous decision-making over a period of time |
| Is focused on the *mitigation* of negative impacts and the *enhancement* of positive impacts | Is focused on maintaining a chosen level of environmental quality and socio-economic conditions (for example, via identification of sustainability objectives and limits of acceptable change) |
| Tends to have a narrower perspective and includes a high level of detail | Tends toward a wider perspective and includes a lower level of detail to provide a vision and overall framework |
| Governed in most instances by legislative requirements and procedural prescripts | Legislated in some instances but otherwise adheres to 'best practice' guidelines / protocols |

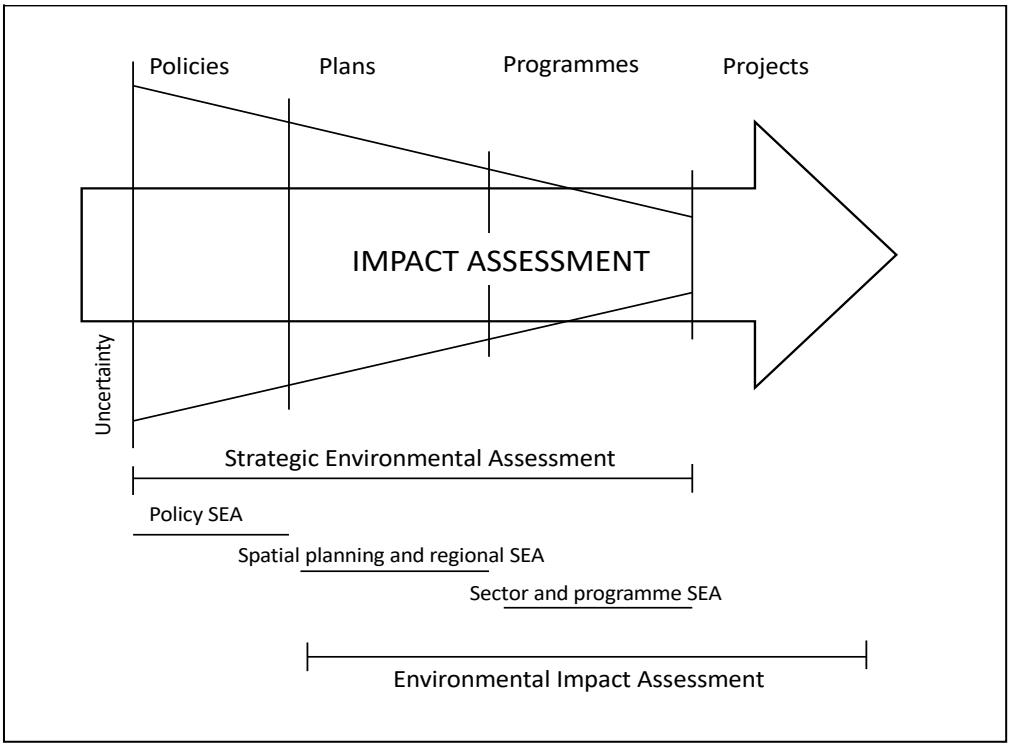
Recognising the need for more flexible and responsive alternatives to EIAs in South Africa, several scholars have indicated that the tool of SEA is well suited to conditions in LMICs (Alshuwaikhat, 2005; Lee, 2000; Retief et al., 2007, 2008). Reasons include, firstly, a reliance by many 'poorer' countries on primary resources and associated activities (such as mining, agriculture and tourism). This reliance amounts to a close connection between livelihoods and social well-being, and the manner in which natural resources are allocated and managed. Second is that nearly all "biodiversity hotspots", and the majority of "pristine environments", are located in LMIC countries according to a report by the World Conservation Monitoring Centre (Retief et al., 2008:505). Spatial planning and policy related decision-making, that goes beyond permitting or denying authorisation for specific projects is, therefore, especially important in these regions (Lee, 2000).

Essentially SEA has evolved out of the classic formulation of EIA outlined in NEPA but adapted to be more flexible and proactive in its approach (Fischer & Gonzales, 2021). In South Africa it has been described as "process that integrates sustainability considerations into the formulation, assessment and implementation of policies, plans and programmes" (DEAT, 2007). Although the tools are distinct in their scope and purpose, SEA and EIA can operate in tandem, whereby the SEA considers 'the big picture' in order to recommend areas or aspects where a more detailed assessment should be undertaken.

Where SEA is similar to EIA is that it usually has an assessment and evaluative component and draws on specialist input to develop recommendations. The SEA must also include stakeholder engagement, thereby accounting for the perspectives of local and national stakeholders, including individuals, civil society, environmental organisations and any other interested or affected party. It is common (and encouraged) for stakeholders to establish communicative networks, enabling them to collaborate towards contributing a group perspective on the issues. It is consequently useful to refer to 'sector-specific' concerns when it comes to SEAs.

Given interlocking concepts in the two tools, the discipline of SEA shares with EIA several challenges (Sadler, 2004). In this respect, several scholars have argued that SEA remains committed to the rationalist perspective and exclusionary expert 'shaped' deliberations, that feature in EIA (Elling, 2009; Emmelin, 2006; Fischer, 2003; Kørnøv & Thissen, 2000; Nilsson & Dalkmann, 2001). Notwithstanding, these difficulties, on a practical level, a strategic planning approach for expansive, multi-site programmes or multi-activity proposals facilitates a "tiering" structure, as depicted in Figure 11, conducive to saving time and resources (Partidario & Fischer, 2004:228; Therivel, 2004:13).

Figure 11: Links between tiers of policies, plans, programmes and projects (DEAT, 2007)




At an international level, there are several drivers behind the development and implementation of SEA. For example, the European Union (EU), introduced a SEA Directive of 2004 which provides a framework for the practice, as a basis for legislation. As confirmed by Hilding-Rydevik and Åkerskog (2011), since the introduction of the Directive, some form of SEA has been implemented in legislation or guidelines in all EU member countries. In the last decade, the United Nations Espoo Convention[22] of 1991 has also entered into force, which includes the Kyiv SEA Protocol. Signatories to the Protocol, currently 38 countries, are committed to take the "necessary legislative, regulatory and other appropriate measures to implement (SEA)…within a clear, transparent framework." The protocol distinguishes between "plans" and "programmes", to which the application of SEA is mandatory, and "policy" and "legislation" to which the application of the protocol is discretionary.

On the African continent, Mozambique, Tanzania, Madagascar, Botswana and Lesotho are among countries that have legislated for SEA (Dalal-Clayton & Sadler, 2005).

[22] The Convention on Environmental Impact Assessment (EIA) in a Transboundary Context (UNECE).

Other than local legislation, an important driver for SEA in Africa, are the lender requirements for donor funded development projects, embodied in the IFC Performance Standards and the wider Equator Principles. The World Bank also introduced a faciliatory conceptual model and operational guideline for SEA in 2010 (Fernando, 2011).

In recognition of its potential as a suitable environmental management tool for South Africa, enabling provisions for the regulation of SEA in NEMA were included at the time the Act commenced in 1998. However, to date, no action has been taken in this regard, and South Africa has not been signatory to the Kyiv Protocol. The implementation of SEA is, therefore, guided by a combination of international best practice, a formal guideline (DEAT, 2004 revised in 2007) and a supplementary information document (CSIR, 2007).

Notwithstanding the absence of prescriptive legislation, SEAs have been undertaken in South Africa since the turn of the century under various descriptors. Retief and colleagues (2007) have identified 50 SEA-type studies, produced between 1996 and 2003 at different scales and in a number of sectors. An overview of various forms of SEA, along with select examples is provided in Table 9. These examples correspond with the types of SEA reflected in Figure 11.

Table 9: Overview of types of SEA and corresponding South African examples

| Model of SEA | Overview | South African examples |
|---|---|---|
| Formal model | This model is primarily an extension of EIA to higher levels of decision making and tends to be reactive to a policy, plan or programme that has been identified or recommended. | SEA for Phase 1 of the Square Kilometre Array astronomy project:2018-2023 (CSIR, 2016a) and the SEA for shale gas development in the central Karoo (CSIR, 2016b). |
| Integrated model | This form of SEA seeks to integrate sustainability considerations into decision points during planning processes. | SEAs that feed into Spatial Development Frameworks (SDFs) and Integrated Development Plans (IDPs) |

| Model of SEA | Overview | South African examples |
|---|---|---|
| Para-SEA model | This refers to tools that have "some but not all of the features or characteristics of SEA" (Dalal-Clayton & Sadler, 2005) | Environmental Management Frameworks (EMFs) introduced via Regulations under NEMA in 2010: defined as studies of "the biophysical and socio-cultural systems of a geographically defined area to reveal where specific land-uses may best be practiced and to offer performance standards for maintaining the appropriate use of such land". These can be conducted at a local or regional scale and are intended to function in harmony with planning instruments such as SDFs and IDPs (Marais et al., 2014). |
| Sustainability led model | This model is one which is favoured by SA's guideline and supplementary information documents (DEA, 2007; CSIR, 2004). It promotes an objectives-led approach and is structured around a sustainability framework. It is intended to integrate socio-economic challenges with the biophysical dimensions of sustainable development. | SEA for wind and solar photovoltaic energy in South Africa (CSIR, 2015). |

In the last decade there has been an upswing in the production of SEAs with government's focus on large "Strategic Infrastructure Projects" (SIPs) as part of its National Development Programme (Day, 2015). A number of these assessments have been commissioned by the administration, and led by the partly state funded Council for Scientific and Industrial Research (CSIR). The potential for these studies to be substantively effective is helped by provisions in NEMA by which the SEA outcomes can be enforced, even if the tool itself is not regulated. For example, in February 2018, eight Renewable Energy Development Zones (REDZ) identified by means of a SEA, were gazetted, and in March 2019, generic environmental management plans for the development of overhead powerlines and for electricity sub-stations were also approved. In practice this means that discrete projects in, and associated with these zones, are not required to go through the more intricate EIA approval process (Fischer et al., 2020). Should the hydrofracking programme comes to fruition, a similar approach has been proposed (Fischer, 2021).

## Background to the project

The SEA that is referred to in this example is formally titled *The Scientific Assessment of Opportunities and Risks for Shale Gas Development in the Central Karoo.* The report, published in November 2016, was commissioned by a collaboration of government departments including those responsible for environmental affairs, energy, mineral resources and water affairs. The SEA is rooted in a prolonged debate about the feasibility of hydrofracturing for shale gas as part of South Africa's energy mix. As explained by Glazewski and Esterhuyse (2017:1), 'fracking' has "raised economic and expectations worldwide as well as in South Africa".

The exact techniques for hydrofracking depends on the geological rock formation in which the gas occurs (de Wit, 2011). In the simplest of terms, fracking technology involves injecting a mix of water and chemicals via cement enclosed boreholes, deep into the earth in order to create enough pressure to break apart the rock, facilitating access to deposits of natural gas. These deposits have derived from the breakdown of organic matter (algae and the remains of plants and animals) occurring in mudflats and fine sediments which, over hundreds of years, has solidified into shale (de Wit, 2011). Once the rock has been fractured, the gas, mixed with the chemicals in the 'fracking fluids' then flows back to the well head on the surface. From these wells, the gas can be distributed via pipelines to commercial consumers, one of the advantages being that it will emit less greenhouse gas compared to other sources of combustion (Butler-Adam, 2016).

Modern-day hydrofracking first started in the US as far back as 1949, but according to the feasibility of shale gas as a significant contender in the fuel market, was recognised when horizontal drilling operations began in 2003 (Gold, 2014; Merrill, 2012; Zuckerman, 2013). The ability to drill sideways from the vertical well significantly improved the production capacity of a single well (Sernovitz, 2016). This technological development is what spurred the shale gas "revolution" in the US (and elsewhere), and also fed a perception that the same could occur in South Africa (Glazewski & Esterhuyse, 2017).

Notwithstanding potential for shale gas to make an important contribution to South African energy mix, there are a number of complicating factors in this country, as highlighted by, among others, de Wit (2011), Scheiber-Enslin and colleagues (2016) and Vermeulen (2012). From a technical feasibility perspective, a key concern is a lack of knowledge about the amount of gas and the variable depths of the deposits. There are related concerns about the quantity of water that will be required, and the vulnerability of sub-surface aquifers to pollution from chemicals in the fracking fluids (Vermeulen, 2012). These concerns are connected to the unique character of the geographic setting where the gas is expected to occur and where the drilling operations will take place. The Karoo basin is a massive geological formation spanning two-thirds of South Africa. As explained by de Wit (2011), even with the best available science, it remains difficult to foresee what the consequences of hydrofracking would be: "interference with such an ancient geologicial formations may not only release methane gas into aquifers, but also cause new connections between aquifers" (de Wit, 2011:10).

Added to these concerns are the socio-economic implications. Despite its relatively low population density and semi-arid landscape, the Karoo is not immune to the many development challenges that exist in other parts of the country. South Africa's Academy of Science's (ASSAf) report on the country's technical readiness to support the shale gas industry sums the situation as follows:

> *The Karoo is a place of unique biodiversity, stark beauty, wide open vistas and unsurpassed night skies. Yet, the Karoo is also a place of intense poverty, with marginalised structurally unemployed people and some of the greatest chasms between the rich landowners and those who own nothing. Therein lies the dilemma for decision-makers* (ASSAf, 2016).

A combination of biophysical and socio-economic attributes is not only a challenge in relation to the Karoo's shale gas potential. As will become clearer in the discourse analysis, diverse land-use options for the Karoo have fostered a symbolic status for the landscape, implying that any type of development proposal is likely to be relatively contentious in this setting at this time.

The policy directive that underpins the proposal for shale gas is the same Integrated Resource Plan (IRP) that was referred to in the previous chapter. According to this plan "study and exploration to determine the extent of recoverable shale gas should be pursued and this needs to be supported by an enabling legal and regulatory framework" (Department of Energy, 2019:21). Along with nuclear energy and coal, shale gas is recommended, to add to the 'base load' of electricity that cannot, according to the DoE, be catered to by renewables. Unlike the long-term prospects for nuclear, however, shale gas is framed as a "transitional" solution to the energy crises (Department of Energy, 2019:21).

An important differentiator between policy on shale gas, compared to nuclear, is that it has not been driven, to the same degree, by corrupt elements in the administration. This does not mean that political agendas have not held sway, as will be discussed further on, just that the shale gas proposition has not been linked to State Capture in the same way as the new nuclear build was. Nonetheless, the Department responsible for Environmental Affairs has been particularly circumspect in their approach to the shale gas proposal. This means that recommendations of the IRP, referring to a "enabling" regulatory environment, has not been translated into immediate calls for tenders and concrete proposals. Instead, there have been several iterations in government's process of assessing the shale gas proposition. These have included an inspection of sites in the US by a delegation including the environmental authorities, to gain first-hand insight into to benefits and impacts associated with drilling operations (Gerber, personal communication, August 2017). Another mark of restraint is the commissioning of a technical feasibility study from the Academy of Science of South Africa (ASSAf, 2016) (cited above), and the impact assessment – that is the SEA commissioned from the Council for Scientific and Industrial Research (CSIR).

## Discourse analysis

I approach the discourse analysis for this case study via the explanatory dimension, as I did in the previous example of the Nuclear-1 EIA. My focus in this, and in the interpretive dimension, is on the discursive quality of the debate that led to up to commissioning of the SEA by a consortium of government departments. Via the lens

of cultural theory, the deliberations and events preceding the SEA can be framed in terms of competing worldviews, key features of which have been translated into Douglas and Wildavsky's grid-group typology (outlined in Chapter 3). In the discursive dimension, I refer to specific examples of symbolic discourse and language-in-use that also reflects the relevance of cultural theory in the interpretation of risk. As I have indicated in the explanation of how I have matched theories to cases, in Chapter 5, cultural theory is an explicit choice for highlighting particular features of discourse about hydrofracking that contribute to my argument for a deeper understanding of risk. The application of another theory could emphasise different, but equally relevant insights. In keeping with the Foucauldian philosophy of discourse analysis the intention is to explore the subtle or 'unseen' manifestation of power in established/customary combinations of words and symbols.

**Explaining the risk: An iconic setting**

As the background to the hydrofracking proposal suggests, like nuclear power, exploitation of shale case to meet South Africa's energy needs is a highly controversial proposition. Fitting within Beck's notion of a risk society, hydrofracking is a reflexive technology – what the IRP refers to as a bridging strategy, between coal (the sins of the past) and renewables (the way of the future). From a psychological perspective, shale gas is akin to types of natural phenomenon that signify the 'last frontier', occurring below the sea's surface, in the outer reaches of space or in this case - the bowels of the earth. As such, the resource has a mysterious or enigmatic connotations, accessible to experts via scientific know how and innovative technologies; and to the public via the stories and images - what Slovic and colleagues (2007) have called the affect heuristic (described in Chapter 3). In the Brent Spar controversy, for example, part of Greenpeace's successful campaign against the sinking of an oil rig as a means of disposal off the coast of Scotland, was a depiction of the seabed as sacrosanct and off-limits (see Löfstedt & Renn, 1997). In South Africa a comparable discourse has been used with respect to astronomy projects, for example by Walker and colleagues (2019):

> *Human engagement with the stars and the dark 'empty' spaces of southern Africa's night skies stretches back into the very deep past; today this fragile cultural heritage is the subject of both re-imaginings and contestations as to ownership and authority* (Walker et al., 2019:628).

Relevant to this case study is how the remote, sub-surface setting for shale gas, arguably arouses a similar sentiment amongst those opposed to hydrofracking. What will be apparent in discourse pertaining to the shale gas debate, is that the proposal is closely tied to the evocative character of landscape in which the gaseous deposits are expected to occur.

As explained in the project background, the shale deposits cover a vast area, measuring approximately 300 000 square kilometres, including parts of the Northern, Eastern and Western Cape. The name for this region - the "Karoo" - derives from a Khoisan (Khoekhoe) word meaning "hard" veld, referring to the dry and rocky character of the landscape (Raper et al., 2014). In the colloquial language of its predominantly Afrikaans inhabitants, the Karoo is often described as "Niks", translated as "nothing" (Glazewski & Esterhuyse, 2017:3). However, what Parkington and colleagues (2019) have highlighted, is that words such as 'middle of nowhere', 'pristine' and 'with no people' are problematic when applied to the sparsely but visibly occupied parts of Karoo. According to these authors such associations "imply the notion of 'terra nullius', the empty land (literally 'nobody's land') that seemed so attractive and inviting to colonial powers the world over" (Parkington et al., 2019:728). It could be argued that connotations with nothingness, even in the present-day, are implicated in the ambitions and intentions of diverse interest groups in respect of the Karoo.

*Starry skies*

One of the features that has transformed the Karoo into a sought-after region is its clear celestial skies and 'radio quietness'. The Karoo provides an ideal locality for star gazing and space research. In 2010 the Karoo, together with Australia's Murchison Shire, were selected by an International SKA Steering Committee (ISSC), as co-hosting locations for the SKA (Square Kilometre Array). The installation, due for completion

in 2020/21, covers approximately 628,200 ha in the northern Karoo and comprises 133 antennas and 64-dish MeerKAT telescope (Davidson, 2012). The resources that enable this project are formally protected in terms of the Astronomy Geographic Advantage Act (21 of 2007). A chapter in the shale gas SEA is thus dedicated to assessing potential electromagnetic interference that may be prompted by drilling operations to access shale gas in the Karoo.

*Mineral deposits*

A second, arguably more controversial attribute of the Karoo, is the presence of uranium deposits. Uranium exploration and some opencast mining has taken place intermittently at various localities in the Karoo over the past 50 years (Issah & Umejesi, 2019). Unsurprisingly, interest in uranium intensified when the government announced its intentions around the new nuclear build. As alluded to in the previous case, the illicit 'nuclear deal' was linked to the dubious purchase of a uranium mine. Before the nuclear deal was quashed, approximately 570 000 ha of land was acquired for prospecting and mining purposes in the vicinity of the Karoo towns of Beaufort West and Aberdeen (Issah & Umejesi, 2018). Although investors have since pulled out, government's persistent commitment to nuclear as part of the country's energy mix, means that interest in uranium is likely to continue, but no doubt under heightened scrutiny of the Department responsible for Environmental Affairs, and other non-governmental environmental watchdogs.

*Renewable energy*

A final attractive attribute of the Karoo is its weather: copious amounts of sunshine and wind ensure that vast tracts of surface area beneath which shale gas deposits may well occur, are well suited to the production of renewable energy. In addition to the eight Renewable Energy Development Zones (REDZs) already identified through a separate SEA process, and gazetted in 2018, three more sites have been proposed in the central Karoo region. Proposals in these localities will receive preferential treatment in forthcoming bidding rounds of the REIPP programme, described previously.

A tabular summary of interests in the Karoo region is presented in Table 10. These, combined with the shale gas proposition, are indicative of varied perspectives on the Karoo landscape and its resources. For the mining sector, the Karoo resources represents opportunity for development and profiteering. For astronomers and scientists, the Karoo is an invaluable site for research and space exploration. For renewable energy proponents, the expanse of the Karoo and suitable weather provides support for an energy revolution in South Africa. Added to this and not included in Table 10 below, is another group of stakeholders who view the Karoo (and its inhabitants) as unique and vulnerable, with intrinsic value that must be protected from all forms of exploitation.

Table 10: Diverse interests and intentions in the Karoo

| Interest | Astronomy | Renewables | Hydrofracking | Mining |
|---|---|---|---|---|
| **Resource** | Atmospheric clarity, radio quietness | Wind, sunshine | Shale gas | Uranium deposits |
| **Project** | Square Kilometre Array (SKA): an international effort to build the world's largest radio telescope, co-hosted with Australia. | Development of Renewable Energy Development Zones (REDZ) with wind turbines and solar photovoltaics (PV). | Slickwater fracking of multiple well sites involving the injection of water mixed with chemicals to hydraulically fracture underground geological formations to release pockets of natural gas. | Deposits occurring mainly in palaeo-channels: riverbed sandstones of the Permian age situated at depths of 5 to 50, excavated from open pit mines & uranium extracted using in-situ leaching methods. |
| **Proponents** | The SKA Organisation: Canada, China, France, Germany, India, Italy, New Zealand, Spain, South Africa, Australia, Sweden, Netherlands and United Kingdom. | Independent power producers (IPPs): participants in a bidding process as part of the Renewable Energy Independent Power Producer Procurement (REIPPP) programme, which includes local and multinational RE companies. | Three multinational companies: Royal Dutch Shell, Falcon Oil and Gas and Bundu Gas & Oil. | Australian company (Peninsula Energy) in partnership with local entities: Tasman Pacific Minerals, Beaufort West Minerals, Lukisa JV Company and Tasman Mmakau JV Company. |
| **Location and extent** | Comprises 133 antennas and the 64-dish MeerKAT telescope. Covers approximately 628,200 hectares of land in the northern part of Karoo, divided into the core area of 131,200 ha (38 land parcels); and the spiral area covering approximately 497,000 ha (131 land parcels). | The most recently proposed REDZ (2019), including sites for wind and solar PV, is in central Karoo surrounding the town of Beaufort West. The extent of development in this region will depend on individual applications and contractual agreements with landowners. | Concession areas for the three companies cover a combined area of approximately 155 000 $km^2$ extending across the central part of the Karoo with Shell holding the largest interest - approximately 90 000 $km^2$. | Uranium exploration and some mining has taken place sporadically in isolated sites for 50 years. Intentions to establish larger mines spurred by a proposed nuclear power plant. Approx. 570 000 ha of land acquired between Beaufort West and Aberdeen for mining at Rhystkuil Kwaggasfontein and Kareepoort. |

| Interest | Astronomy | Renewables | Hydrofracking | Mining |
|---|---|---|---|---|
| **Environmental regulation** | SKA is designated a Strategic Infrastructure Project (SIP) under auspices of the Presidential Infrastructure Coordination Council (PICC). Licenced on the basis of a Strategic Environmental Assessment (SEA) in terms of the National Environmental Management Act 107 of 1998 (NEMA). The Integrated Environmental Management Plan (IEMP) is overseen by the National Research Foundation. The Astronomy Geographic Advantage Act 21 of 2007 prohibits activities that may cause light pollution or radio frequency interference. | Eight Renewable Energy Development Zones (REDZs) were identified through a SEA (CSIR, 2015) process and gazetted in 2018. An additional three have been proposed by the expert reference group (October 2019). Zones are designated SIPs (like SKA) benefitting from an expedited environmental authorisation process. | As a "petroleum resource" shale gas is regulated in terms of the Mineral and Petroleum Resources Development Act 28 of 2002 (MRDA). A four-phase regulatory approval process applies: reconnaissance permit, technical co-operation permit (TCP) exploration right and production right. All require environmental authorisation except the TCP. The Minister of Mineral Resources is responsible for site specific authorisations but appeals are referred to the Minister of Env. Affairs. | As a "mineral resource" uranium is also regulated in terms of the MPRDA. The regulatory approval process comprises a reconnaissance permit, a prospecting right, a mining right or a mining permit (the latter applies to smaller operations). All require environmental authorisation except the reconnaissance permit. As with petroleum resources, the Minister of Mineral Resources is responsible for site specific authorisations but appeals are referred to the Minister of Env. Affairs. |
| **State of progress** | Under construction with observations scheduled to begin approximately mid-2020. | The Minister of Environmental Affairs is in consultation with other government entities regarding the expert reference group's recommendation for the three additional REDZ including the site in the Karoo. The site is likely to confirmed in the government gazette by June 2020 which will stimulate applications by a host of IPPs in Round 5 of bidding process that is part of the REIPPP. | Three TCPs were awarded in 2010. Applications to convert these to exploration permits were halted by a government imposed moratorium in 2011, and lifted in March 2012. The Department of Energy's Integrated Resource Plan (IRP) (2019) recommends exploration to determine the extent of deposits be pursued and "supported by an enabling legal and regulatory framework". | Despite successful applications for prospecting, and subsequent applications for mining rights, the proponents have pulled out sensing the EA approval was unlikely. However, government's policy on nuclear remains a "no regret" option in the IRP of 2019. Given the intention to develop nuclear to the extent of 2500 MW "at a moderate pace and scale", future interest in uranium mining cannot be discounted. |

**Interpreting risk: Competing interests and competing discourses**

In outlining cultural theory in Chapter 4, I highlighted some of the important and complex concepts that underpin the relatively simple grid-group typology (Figure 4, Chapter 4). These concepts include that of 'othering' (matter out of place), guarding boundaries and the forensic quality of risk linked to blame. Douglas's associated ideas about solidarities or subcultures, offer many avenues for exploring conflict and controversy. In the Karoo debate there are clearly features of discourse that reflect the overarching Centre and Border categories in the grid-group typology proposed by Douglas and Wildavsky (1982) (Table 2, Chapter 4). Representing the Centre are state institutions responsible for promoting the mining and energy sectors of the economy, and the transnational fossil fuel companies that would undertake the hydrofracking. The Border is represented by the non-state actors who associate the Karoo with more symbolic types of value. The instances of discourse and social practices that I reflect on in this section, provide insight into the allegiances and power of group dynamics, via the lens of cultural theory.

*Centre aligned perspectives and behaviours*

The process that led to the SEA for hydrofracking began in 2009/2010, when three transnational companies, optimistic about the potential for shale gas deposits in the Karoo, lodged applications for technical co-operation permits from the Department of Minerals and Energy. These permits, issued in terms of the Mineral and Petroleum Resources Development Act (MPRDA) (28 of 2002), allocated rights to the respective companies to apply for exclusivity, regards exploring for shale gas in specific areas. The issuing authority is the Petroleum Agency of South Africa (PASA), a statutory body established in terms of the MPRDA (Glazewski & Esterhuyse, 2017).

By far the largest concession was granted to the Royal Dutch Shell Company. Relevant to Shell's approach to shale gas exploration in South Africa, is the company's experience in drilling for shale gas in the US, where Shell's operations in the Permian Basin stretch from Midland, Texas, to the south-eastern border of New Mexico. It also has access to 260,000 acres in the Delaware Basin covering three gas rich geological

formations (Zuckerman, 2013). The US 'picture' of shale gas mining, arguably provides the most iconographic reference for both supporters and opposers of fracking technology (Rijsdijk, 2017). In that country, blanket permission has been granted for hydrofracking in all but three States, with associated activities regulated at a federal level - and exempt from several federal laws (Sernovitz, 2016). Property rights in the US constitutes ownership of underground as well as aboveground resources. This has resulted in the oil and gas companies independently negotiating deals with private landholders to exploit shale gas, with relatively little institutional interference from the administration. It is estimated that approximately 12 million American property owners receive royalties for the exploitation of oil, gas and other mineral resources (Cusick & Sisk, 2018).

Off the back of its success in the US, from the outset Shell pursued an aggressive campaign to promote the benefits of shale gas in South Africa (Murcott & Webster, 2020). However, what soon became evident was that the conditions for shale gas in the Karoo were far off replicating those in the Permian Basin of the US. This is partly owing to the highly complex geology of the Karoo basin, with extensive fractured dolerite intrusions into the shale, creating multiple pathways for migration of water (and pollutants) (Steyl et al., 2012). Another distinguishing feature of the South African context is that mineral and petroleum resources are designated the "common heritage of all the people" in terms of section 3 of the MPRDA. In practice this means that property owners cannot lay claim to un-severed mineral and petroleum resources. Acquiring permission to access the resource is thus an exceedingly complicated and bureaucratic process (Plit, 2017). Furthermore, the South African government is set to levy State as well as contractual royalties. Regulations in terms of the MPRDA, introduced in 2004, entitles government to an automatic 20% stake in fracking enterprises - a significant disincentive for multinational companies (Creamer, 2013).

In spite of the economic and administrative hurdles that have hindered Shell in pursuit of shale gas exploitation in the Karoo, ultimately it has been the dissenting voice from 'the Border' that has affected Shell's plans. In 2011 a complaint was bought

before the Advertising Standards Authority (ASA) by the TKAG[23]. Shell was charged with misleading the public in their media campaign by exaggerating the benefits of fracking. Objections to the promotional material related to vague and unsubstantiated claims including hyperbolic phrases such as "dramatic increase", "never been a single case of groundwater contamination", "marriage of technologies". The ASA rejected Shell's defence that these were an accurate reflection of the company's opinion, and ordered that the adverts be withdrawn.

Via the lens of cultural theory, Shell's campaign in South Africa is indicative of a centre-aligned perspective of risk. Accordingly benefits accrue to those willing to take chances, and resources (extrapolated from a robust/resilient natural environment) offer opportunities for progress. Reflective of this attitude, one of my interviewees describes their experience in the oil and gas sector, explaining how entrepreneurs tend to expect stakeholders to align to their worldviews, and recognise the opportunities offered by innovation and taking initiative. Similarly, another interviewee explains how "in actual fact, the point of departure is really kind of weighted in their (industry's) favour…everything is expressed relative to that baseline, as opposed to a kind of zero baseline" (IR1-15.03.2021).

When shale gas hydrofracking was first mooted, a discrepancy in tolerance of risk, as inferred in my interviews, was evident in the attitudes of the authorities. Compared to a cautionary approach on behalf of the Department responsible for Environmental Affairs, the Department responsible for Minerals and Energy (DME) was initially prone to regulate, rather than avoid the risks associated with hydrofracking. In an effort to create policy certainty for investors, including Shell (and others mentioned in Table 10), in 2015 the DME published "Regulations for Petroleum Exploration and Production".[24] These were met with a vociferous response from the anti-fracking lobby. Following a judicial process that saw the matter before the Supreme Court,[25] most of the provisions of the Regulations were declared *ultra vires* for the simple

[23] Treasure the Karoo Action Campaign
[24] GNR 466 in GG 38855 of 3 June 2015
[25] Minister of Mineral Resources v Stern & others (1369/2017) and Treasure the Karoo Action Group & another v Department of Mineral Resources & others (790/2018) [2019] ZASCA 99 (4 July 2019).

reason that they referred to environmental matters which only the Minister responsible for Environmental Affairs, and not the Minister of Mineral Resources, has the power to regulate. Prior to this verdict in January 2012, following the ASA ruling against Shell, the North Gauteng High Court had also found the Minister of Minerals guilty of non-compliance with the Promotion of Access to Information Act (PAIA) (2 of 2000). As a result, NGOs and interest groups were privy to details of the government Ministerial "task team" set up to investigate the case for fracking in the Karoo - information that had previously been withheld.

In all three of these legal matters preceding the SEA, the outcome favoured the Border-aligned solidarities acting out of concerns about harmful effects of hydrofracturing, and sceptical of the motives of centre-aligned actors (see Table 2, Chapter 4). Perhaps more important than the decisions themselves is that the rulings were not based on disputes over scientific information about the risks of hydrofracking, but on ethical codes of behaviour. A lack of transparency was also demonstrated by rival companies' unwillingness to share "trade secrets" about the composition of their fracking fluids and proposed methods to extract the gas, as well as the status of their negotiations with the institutional decision-makers (de Wit, 2011). Both the administration, and the multinational companies were reprimanded in the courts for being disingenuous in their dealings with civil society. In the following discussion of the border-aligned perspective, it will become apparent how the non-state actors saw opportunity to stress the moral dimension of the debate.

*Border aligned perspectives and behaviours*

Leading up to the publication of the SEA, much of the debate around shale gas, outside of institutions and the market, was informed by symbolic representations. The film *Gaslands* (released in January 2010) amplified the harms associated with fracking by highlighting the personal experience of US residents. Scenes from the film of drilling rigs dotting the American countryside, contaminated boreholes and people's tap water catching alight, affected civil society's perceptions of the risks associated with fracking. A comparably affective South African documentary, called *Unearthed* was released in 2014. The film highlights the negative implications of hydrofracking by

focusing on the unique environmental attributes of the Karoo and vulnerability of its inhabitants.

In the South African NGO sector, influential campaigns against fracking have been launched by the Treasure Karoo Action Group (TKAG) and the South African Faith Communities Environmental Institute (SAFCEI). Leading activists in both organisations have been recipients of an Goldman Environmental Foundation international award, recognising significant contributions to grassroots environmental activism (www.goldmanprize.org). Although largely in pursuit of the same goals in respect of the Karoo, the two groupings are distinctive types of 'Egalitarian' solidarities that rely on discrete symbols and associated discourses. I have drawn a comparison of the two NGOs in Table 11, based on Douglas and Wildavsky's (1982) conceptualisation of the egalitarian perspective in cultural theory.

Table 11: Egalitarian alliances and strategies

| **Alliances** | **South African Faith Communities Environmental Institute** | **Treasure Karoo Action Group** |
|---|---|---|
| **Cultural theory descriptor** | Broadly sectarian: interest in saving all of nature | Local interventionist: interest in saving bits of nature |
| **Symbol** | Logo depicts Africa from a global perspective and includes a stylised person, holding a branch, embracing the earth. The (olive) branch symbolises peace in Christian theology but also represents victory according to the customs of ancient Greece. | Logo depicts a stark rural landscape and an isolated windmill - an abstract rendition of the rural idyll that reflects the group's perception of how the Karoo is, and should remain. |
| **Discourse** | Depicts a humankind that is susceptible to being seduced by materiality and worldly ambition, associated with the profit-driven motives of the multinationals and their ambitions to exploit nature for monetary gain: *"We emphasise the spiritual and moral imperative to care for the Earth and the* | Appeals to the priorities of the decision-takers and lawmakers: *"We believe that until it has been proven that shale gas is in the best interests of all South Africans, and in line with Section 24 of the Constitution which guarantees the right to an environment that is not harmful to* |

| Alliances | South African Faith Communities Environmental Institute | Treasure Karoo Action Group |
|---|---|---|
| | *community of all life…"* (https://safcei.org). | *health or well-being, it should be opposed"* (https://treasurethe.co.za). |
| **Structure** | Flat structure with diffuse responsibilities. | Structured with distinct leadership position. |
| **Membership** | Spectrum of faiths including African Traditional Healers, Baha'i, Buddhist, Hindu, Muslim, Jewish, Quaker, and a wide range of Christian denominations. Differences between religious orders secondary to a united claim to spiritual worthiness, and a replacement of variable gods with a single nature/earth. | Local stakeholders and supporters who want to be part of smaller, intentional and arguably more elitist alliance. |
| **Funding** | Encouraging crowd funding and support. | Encouraging of individual donors and sponsors. |
| **Attitude to science** | Undemocratic and likely to side with vested government or capitalist interest. | Potential for science to be independent and persuasive – open to notion of 'proof'. |

As mentioned in Chapter 6, the activities of egalitarian solidarities reflect what Beck (2006) refers to as sub-political activity. SAFCEI have led a targeted campaign against the "Centre" (hierarchical and market entrepreneurial solidarities), challenging their veiwpoints, and highlighting the moral and ethical dimensions that come with the imposition of risky technologies. SAFCEI is the organisation who, in partnership with Earthlife Africa, took legal action against the Minister of Energy in the case around nuclear procurement. Using different tactics toward the same goal, the TKAG have amplified the intrinsic value of the Karoo landscape, and has also mobilised the inhabitants of the Karoo against fracking and other mining activities. It brought the charges against Shell before the ASA in respect of its promotional advertising; and the lawsuit against the Minister of Mineral Resources for *ultra vires* attempts to pass the hydrofracking regulations. As confirmed by Murcott and Webster's (2020) review of litigation on the issue, the combined interventions of these two groupings has been instrumental in shaping the fate of the proposal for hydrofracking in the Karoo:

> *(T)he power of the state to authorise fracking through domestic regulation may be weakened by non-state actors who engage in litigation in order to prioritise the protection of this area. By so doing, these non-state actors also act as a counterbalance to the powerful transnational corporations who have immense economic power and incentives to exploit untapped shale gas* (Murcott & Webster, 2020:163-164*).*

Against this backdrop it is fair to assume that campaigning from the Border helped bring about a decision on the part of the Department of Mineral Resources to impose a brief moratorium on shale gas exploration applications in 2011, for a period lasting 17 months (Glazewski & Esterhuyse, 2017). Since the moratorium has been lifted, the hydrofracking project for the Karoo has lost some of its initial momentum. As Murcott and Webster (2020) point out, the permits that the DME were expected to issue during 2019 were not forthcoming. Despite this, in a recent presentation at the annual conference of IAIA, a representative of the Department responsible for environmental affairs, indicated an intention on the part of government to proceed with the hydrofracturing programme in the short term (Fischer, 2021).

Apart from the actions of the NGOs, there are likely other influences beyond the control of the key role players that have affected the viability of the project, prompting Shell in particular, to scale back on its intentions. In addition to policy uncertainty on behalf of the South African authorities, the vagrancies of oil and gas prices also play a role in the appetite for shale gas among transnational fossil fuel companies (Toerien, 2015). Furthermore, it is likely that the anti-fracking campaign was bolstered by one of the worst droughts in South Africa's history in 2018 – an occurrence that has added credence to concerns about the amount of water hydrofracking requires, and the amount of water it pollutes (Avenant et al., 2016; Mabidi et al., 2017).

What is clear from events leading to the commissioning of the SEA, is that both the length and litigious character of the debate around hydrofracking has prompted the emergence of distinct and polemic positions on the issue. It has uncovered disparate worldviews and allied behaviours, particularly among private companies and investors (the market entrepreneurs), government entities (the hierarchy) and the NGOs (egalitarians). Via the lens of cultural theory the dispute over shale gas also has

elements in common with Alexander's (2018:199) stance on what happens to inhabitants in a "capitalistically globalised world":

> *'(H)appenings' or actions are actually undertaken by other, often, external groups of people. These were often invaders or conquerors disregarding the will of the local inhabitants. This has happened when warlike people from certain countries have simply invaded or occupied lands and territories, say, during the so-called colonialist and imperialist periods of history. The result is that such situations have almost come to be 'naturalized' in the eyes and expectations of these outsiders. What part has such outsiders and their successors played in transforming our physical environment? And who are the contemporary groups who are continuing the ongoing degradation of the physical and geographical condition of our world? There are the usual suspects…multinational corporations and their political allies* (Alexander, 2018:199).

In the descriptive dimension, I consider how the discourse in the SEA seeks to introduce the rational scientific perspective of risk, amongst the competing views of the Centre and Border alliances alluded to in the above citation.

#### Describing the risk: Symbolic discourse and the 'fracking' narrative

The SEA for "Shale Gas Development in the Karoo", was commissioned by the National Department of Environmental Affairs, supported by the Departments of Energy, Mineral Resources, Water Affairs and Sanitation, Science and Technology and Agriculture, Forestry and Fisheries, and the Provincial Governments of the Western, Eastern and Northern Cape. The report has been compiled by the Council for Scientific and Industrial Research (CSIR). This Council was established by an Act of Parliament in 1945 to conduct multidisciplinary research in many fields "pertaining to the health and well-being of South Africans" (https://www.csir.co.za). The CSIR's primary shareholder is the South African Parliament, held in proxy by the Minister of Science and Technology. Figure 12 is a screenshot of the landing page of the CSIR website dedicated to the SEA, populated with the logos of the state aligned role players involved in the production of the assessment.

Figure 12: Landing page of the SEA website


As has been described in the explanatory dimension, the high level assessment comes in the wake of a protracted debate and controversy about the advantages and disadvantages of shale gas exploitation. The struggle highlights tensions between government departments, as well as between transnational investors and civil society. For this reason, the commissioning of the SEA is, arguably, intended to serve an instrumental purpose in generating knowledge; and a symbolic purpose in showcasing a co-operative approach to overcoming what Toerien (2015:347) refers to as "paradigm paralysis" in respect of how to move forward on the issue of shale gas. The logos of all those involved, as depicted in Figure 12, sets an hierarchical 'tone' for the report. This perspective (as explained in Table 2, Chapter 4) favours harmony over dissent, with the attitude toward risk being cautionary and reliant on expert input.

Against a contentious backdrop, the intention behind the SEA is, therefore, to provide an objective, scientific evaluation of hydrofacking, and a more exact assessment of the risks to the Karoo and its inhabitants. Implicit in this purpose is the hierarchical view of nature which underpins the discipline of IA more broadly. Accordingly, the biophysical environment can be expected to behave predictably: shocks to the system can be accommodated, but care must be taken not to exceed the limits (Thompson et al., 1990). As reflected in the foreword to the SEA, these thresholds can be delineated by scientific and expert-led determinations:

> *The result of this collaboration, reported on in this document, is a meticulous and multi-disciplinary assessment which presents, in an objective and balanced fashion, the*

> *opportunities and risks associated with shale gas development in South Africa across different scenarios. Over 200 of the best national and international scientists have, over 18 months, contributed to this study, and through a process of rigorous peer review ensured that we have made the best use of the evidence and insights at our disposal…It is the largest scientific assessment undertaken in South Africa in terms of material scope and participation, both scientific and stakeholder based* (SEA:978-0-7988-5631-7:11.2016:Preface, 1).

In line with the purpose to enhance the knowledge base on which decisions about hydrofracking can be taken, the comprehensive scientific approach described in this citation is intended to promote what Jasanoff (2013:168) describes as 'truth' above politicking. What is reflected in the citation is the expectation that good science and transparent decision processes will penetrate the national conscience, arguably realising what Bartlett and Kurian (1999:418) refer to as a "common will", based on a plausible interpretation of the evidence. According to cultural theory's grid-group typology, the hierarchical solidarity and associated view of nature, is prone to managing disorder and, as far as possible, reducing forms of uncertainty. This imperative is reflected in the deployment of a risk-based approach to the SEA – a "rigorous and systematic risk assessment" (SEA:978-0-7988-5631-7:11.2016:7). As explained in the description of the methodology in the report:

> *The risk assessment approach takes its point of departure from the fact that there is residual uncertainty about all aspects of the future even after that uncertainty has been constrained …Risk is determined by estimating the likelihood of events or trends occurring, in relation to their consequences i.e., likelihood x consequence = risk* (SEA:978-0-7988-5631-7:11.2016:18)

> *The issues addressed are investigated by large and diverse teams of experts. During assessments, subjective judgements are often required, but these are made explicitly, along with statements of confidence. Balance and the elimination of bias are achieved through the establishment of broad multi-author teams representing a range of interests and/or positions, coupled with extensive, transparent review* (SEA:978-0-7988-5631-7:11.2016:Preface,2) .

An inevitable challenge for the hierarchical outlook lies in the high standard of precision it sets for itself. As Thompson and colleagues (1990) point out, the hierarchy will be surprised if others do better based on less evidence, less control or less knowledge. An example of how challenges still manifest in this regard is provided by the "integrated risk picture" that is presented in Summary for Policy Makers. Here spatially specific risk profiles are translated into a series of composite colour-coded maps corresponding to various scenarios for shale gas. A limitation of these depictions is that they cannot cater to aspects of the assessment that are non-measurable, that sit outside the parameters of the GIS tool used to produce the integrated result. These risks relate to, *inter alia*, social fabric, sense of place (solastalgia), impacts on the economy (SEA:978-0-7988-5631-7:11.2016:65). As pointed out by Irwin and colleagues (1996) quantified predictive methods tend to understate what falls outside their field of vision, and to overstate what falls within. Often what is overstated in the rational-scientific frame corresponds to the hierarchical predilection for order and discipline, whilst the moralistic or humanitarian concerns of the egalitarian worldview are, albeit inadvertently, "othered".

Although the SEA places considerable emphasis on scientific evidence and impartial knowledge, reading against the text, reveals features of the language that are germane to the mining sector. Through the lens of cultural theory, the discourse reveals how the "social is built into the risk object" (Horlick-Jones, 1998:80); bearing in mind that the grid-group typology is premised on their being bias in everything that humans do and want. The highlighting of certain words reveals how, within the taken-for-granted description of the "objective characteristics of physical artefacts, the social inevitably intrudes" (Horlick-Jones, 1998:80).

> ***Natural*** *gas in the Karoo basin is said to be* ***unconventional*** *in that it does not occur in* ***pockets*** *of porous rock…from which it would* ***flow*** *without* ***stimulation*** *if* ***penetrated*** *by a well. Unconventional shale gas occurs as methane* ***trapped*** *in shale formations…from which it can only be* ***released*** *by the process of hydraulic fracturing, popularly known as* ***fracking*** (SEA:978-0-7988-5631-7:11.2016:11).

Reflected in this extract is a concern expressed by Randall (2012) in a blog explaining "Why the language of fracking demeans women and nature and closes off debate":

> *The term 'fracking' is shorthand for hydraulic fracturing, the process by which rock fissures are forced open with a mix of water and chemicals to release gas trapped deep below the earth's surface.... What lies behind the metaphor however is a view of sexual relations that is aggressive and demeaning to women... This is the language of inequality, hierarchy, dominance and sexism. So the young geologists joking about 'fracking' play into a view of the earth and its natural resources as a woman to be similarly objectified and exploited. She is to be explored, controlled and penetrated. Once used – damaged and polluted – she can be abandoned and virgin territory sought* (Randall, 2012:n.p.).

As argued by Coe (2010) and Alexander (2018), choices of metaphor are important in any discipline because they 'create' a particular perspective - they direct attention, embody an attitude and lead toward actions. In Box 4, I draw on the description of the natural gas deposits and proposed means of extraction (SEA:978-0-7988-5631-7:11.2016, pages 10 - 14) to propose an extended metaphor that aligns to the hierarchical world view of nature.

The extended metaphor (in which shale gas is trapped, released and treated) has the distinguishing features of a paradigmatic story: (Once upon a time) opposing forces meet and interact, heroic acts are undertaken, and victims are rescued and healed. Reflected in this interpretation is Fairclough's notion of "intertextuality". The concept of intertextuality points to the productivity of texts, to how they can transform prior texts and restructure existing conventions (genres, discourses) to generate new ones (Fairclough, 1992). It does not, however, "imply a limitless space for textual innovation and play, it is socially limited and constrained, and conditional upon the relations of power" (Fairclough, 1992: 102-103).

**Box 4: Alternative constructionist reading of shale gas mining discourse (derived from pages 10 -14 of SEA Summary for Policy Makers)**

*The gas is trapped:* Shale gas, also referred to "tight" gas, is held in the Karoo basin at the locations described as "sweet spots", from which it is "freed" by the process of hydraulic fracturing. A 'shale gas as victim' metaphor is suggested by the tactical-type and combative descriptors of the seismic events that led to the entrapment of the gas, including the words/phrases: "geological upheavals", "intrusion of hot lava", "pinch out northwards" and "concentrate".

*The gas is released:* At this stage of the mining process, technology, in the form of hydrofracturing, comes to the rescue of shale gas with its powerful characteristics and abilities to counter the seismic forces that led to the trapped ("unconventional") circumstance of the gas. Words and phrases used to this effect in the report include "penetrate", "targeted", "drilling", "repeated exercises", "fracture", "advance", "exploit", "yield", "intensity", "extreme".

*Nature is restored:* The post-drilling rehabilitation phase is marked by a shift in discourse from a combat type metaphor, to medicine and healing. This is suggested with the words "plugging", "treatment", "monitoring", "rehabilitation", "wellpad", "remediation". Finally, exploration wells that are no longer operative are described as "abandoned".

My reading of the text is offered, not as a criticism of the SEA, but as a reminder of Horlick-Jones's (1998:80) contention that "our understanding of the world is fundamentally ambiguous by virtue of the existence of symbolism, resulting in… a multitude of different meanings according to context". As Healey (1996:10) points out "(c)ommunicative acts contain assumptions and metaphor, which by conveying meaning, affect what people do". Accordingly, the discourse analysts role is to "dismantle the language aspects" (Alexander, 2018:199). The process of dismantling helps to explain why risks are perceived differently by different social groups with distinct worldviews.

The adoption of a particular rhetoric in respect of mining, resonates with the outcome of Cashmore and colleagues' study of the "making up" of expert practitioners. These authors underscore how particular vocabularies are relied upon "to translate the world… into terms amenable to programmatic government" (Cashmore et al., 2015:87). In doing so, environmental change is familiarised - risks are calculable, nature's characteristics knowable, ecosystems are providers of services, and so forth (Cashmore et al., 2015).

Also evident in the alternative reading of the discourse in Box 4 is Douglas's description of the solidarities in the grid-group alliance, whereby she uses the example of a soldier to epitomise the hierarchical way of life and an angel to signify the egalitarian solidarity (Douglas, 1982a). The diagnostic properties of risk including harm and strategy are clearly a feature of the metaphor, with the object of value being the shale gas on the one hand (prized by the market entrepreneurs), and nature's integrity on the other ("treasured" by the egalitarians). In this regard, Alexander (2010:65) underscores how the physical, sociological, institutional and organisational context for environmental issues is mediated and filtered by language, affecting "what we see and hold sacred or valuable in the world".

What is fundamental in respect of the entire shale gas proposition is the issue of uncertainty. Hypothetical models anticipate that the occurrence of the gas could, at worst, be negligible. At best, scientists have offered estimates varying from 13 to 390 Tcf (trillion cubic feet) (de Kock et al., 2017:1). According to de Kock and colleagues (2017) even this broad range is speculatively based on variable characteristics of the geological formation.

De Wit (2011) encapsulates this dilemma as follows:

> *Certainty eludes us because of intractable problems - in mathematics, physics and in both natural and social systems. All these require infinite (and therefore unrealistic) information to predict precisely how nature's networks will evolve into the future. Because of this unpredictability, it surely makes good sense to err on the safe side - but, and this is the policymakers' conundrum, in the case of Karoo gas, which is the safer side?* (de Wit, 2011:2)

In this statement, de Wit (a geological scientist by training) implies that even the best science has to offer may not be sufficiently robust to withstand what Gardiner (2011), quoted by de Wit (2011:1), calls "the perfect moral storm". Through the lens of cultural theory, it can be appreciated that the "safer" side will always be that which does least environmental damage from the perspective of the egalitarian solidarity and the 'wall of virtue' from which they defend their way of life. From the individualist/market entrepreneur perspective, the "safe" approach is one which cannot afford to miss an opportunity to "create positive sum gains" by making the most of "expandable" resources for the sake of economic growth (Thompson et al., 1990:8). For the hierarchy, represented by government and their scientific advisors, "safe" means abiding by the rules and organisational structures for fair and accountable decision-making.

Debates such as this, test the customary notion that nature behaves according to fixed laws, and people are fickle. Although the grid-group typology has been criticised for being overly "parsimonious", even the suggestion that humankind be categorised into four or five 'personas', is indicative of a certain uniformity that may, nowadays, be more pronounced in society than in the natural world. In this respect, Sarewitz (2000) notes how social attitudes to allocations of power and resources, justice, equality, individual and community freedoms – do not in their essence change much over time, compared to nature's richness. Real-world evidence lies in the categorisation of people as 'anti-vaccs' and 'pro-vaccs' in respect of the COVID-19 pandemic. Again, this "live research" lab that surrounds us at present shows how understanding social and cultural behavior is as important, and arguably simpler if it were not overlooked, than predicting the conduct of the virus itself, with its innumerable variants.

## Summary of findings

At the crux of the grid-group arrangement, into which the key tenets of cultural theory are translated, is the idea of discrete worldviews as a basis for "solidarity" among communities. Solidarities are defined in terms of the boundaries they establish, the values they share, including attitudes towards nature, which cumulatively shape group, or cultural, responses towards risk. As demonstrated in the debate over Karoo

resources, the solidarities described in the grid-group typology can be associated with the discourses by which they define their positions.

The explanatory dimension of the hydrofracking example refers to government's need for an overarching impartial and scientific perspective of the hydrofracking proposition, to facilitate a solution to the hydrofracking dilemma amidst polarised positions. Ultimately, decision-makers prefer a decisive science, which either identifies an overarching 'fatal flaw', or provides unambiguous support for a proposal. However, as this case demonstrates, the social and biophysical setting for risky technologies is invariably complex and prone to conflict over what is most valuable, and therefore most vulnerable. Cultural theory is relevant to how such conflicts are embedding in different worldviews, how these relate to one another, and how they inevitably compete for hegemony. Further confirmation of the challenge this poses for IA is provided by this extract from one of my practitioner interview transcripts, where the EAP is referring to a specialist study undertaken for an EIA for a different, but also very controversial, development proposal:

> *We find it absolutely amazing that they are not really using scientific principles to do that. They don't like this project. I don't think anyone likes the project, but it is still incumbent them to use a valid basis on which to call a fatal flaw. Not because one of them is an avid birdwatcher and is worried about what it's going to do to one of the places where people like to go and watch birds or what he thinks it's going to do. And it creates a real dilemma for us as practitioners because we would never override the findings of a specialist.* (IR2:19.03.2021).

Whilst one appreciates the frustration of the EAP and the expressed desire for consistency; reading against the text, it is possible to identify 'discursive markers' that offer a more nuanced perspective, juxtaposing the "principles" of science with the "likes" of citizens. The interpretive dimension for the hydrofracking case study explicates this dilemma, showing how particular discourses are connected to worldviews which define objects of value. In this regard, even an environment as stark as the Karoo, is host to an eclectic mix of mystical, elusive but sought-after resources (stars, sunshine, wind, buried repositories of metals and gas).

As suggested in the extract from the interview, the measure of intangible environmental qualities is not amenable to reductionist processes where knowledge is produced in disciplinary silos. Outcomes will inevitably involve compromise and trade-offs, in which alternative worldviews are implicated. Important in identifying and negotiating trade-offs are theories that arguably provide something more than what Fischhoff (2012:219) refers to as "undisciplined speculation about the beliefs or motivations of other people". In this respect cultural theory can be used descriptively, but it is most useful to consider *how* power is evoked via a commitment to a particular ideology or way of life. Distinctive egalitarian views on the hydrofracking proposal, reveals the influential sub-political tactics, and how these redress power relations and effect social change.

In the descriptive dimension of the case study, the SEA is presented as a strategic intervention to steer the course of the debate around hydrofracking toward more rigorous scientific principles and a stronger evidentiary basis for decisions. Collaboration amongst state actors in respect of the SEA comes in the wake of inconsistencies in government policy on fracking. Arguably, as Hajer (1995:281) indicates in his analysis of the acid rain debate, science can offer a unifying language to facilitate the search for the most effective and most efficient solution (Hajer, 1995:281). What the descriptive dimension suggests is how the language of science can also, inadvertently, reinforce power relations. Through the lens of cultural theory, this tends to uphold distinctions between different worldviews, as words and symbols become the 'guardians' of a particular interpretation of risk.

Relevant to the decision that emerges from the debate over hydrofracking is Foucault's proposition that power can be constitutive in that it creates the conditions that "shape the social and physical world" (Sharp & Richardson, 2001:196). Contestation over hydrofracking in the Karoo reveals how competing discourses can be productive and influential in steering the course of a debate. Consequently, it is more likely that elements of tacit and scientific knowledge will contribute towards the final outcome.

# Chapter 9

# Conclusions

This thesis has focused on addressing three enquiries concerning the relationship between risk and IA. First, how has risk come to be interpretated in IA from a realist perspective? Second, what alternate meanings of risk contend with the realist interpretation? Finally, how can a deeper appreciation of competing constructions of risk contribute to IAs capability to integrate stakeholder values and recognise power dynamics?

In the first part of the thesis, I focus on the realist definition of risk and its limitations for the contemporary discipline of IA. I explain the derivation of probability theory with its roots in the deterministic philosophies that have driven progress in science and technology. I argue that this is the prevailing interpretation of risk in the IA discipline. It fits with the rational model as a method for reducing uncertainty through the acquisition of more complete knowledge. I also suggest that the weight of relatively erudite scientific arguments in determining impact significance, tends to overshadow the evaluative component and its associated complex combination of challenges relating to pluralism, uncertainty and power.

In Chapters 3 and 4, the emphasis shifts to uncovering other ways of understanding risk. These are underpinned by the alternative idea of an open future in which uncertainty is inevitable, time is relative and all knowledge is partial. I proceed to build a comprehensive conceptual and theoretical framework to back this proposition. The framework is supported by three theoretical perspectives (social, cultural and psychological) that have not previously been synthesised in theory building endeavours for IA. Linked to this framework is an equivocal notion of risk, as a product of discourse, which can vary along a continuum from highly realist to highly constructionist. To provide additional insight and to demonstrate the validity of the concepts and theories, these are applied using the methods described in Chapter 5, to

three South African case studies (Chapters 6 to 8). The study types represent the cornerstones of IA practice in South Africa: the specialist study, the EIA and the SEA.

In this last Chapter I draw on my findings to stress the need for a deeper and more nuanced understanding of risk for the IA discipline. I translate this imperative into practical guidance for the art of evaluating significance in IA, focusing on stakeholder values and power dynamics. In my final conclusions this advice is linked to the escalating levels of uncertainty and anxiety that will inevitably shape the forward trajectory of the discipline.

## Reckoning with an extant phenomenon of risk

A premise for this research is that the discipline of IA is inextricably intertwined with the concept of risk. In this view the practice of IA is based on risk being orientated toward the future, but dependent on choices and decisions about impact significance made in the present. Risk and the construction thereof, is thus inseparable from IA's mandate to anticipate consequences and to do so within a framework of sustainable development. IA must attend to potentially significant impacts on the biophysical environment, in addition to well-being of stakeholders, respect for ways of life, security, identity, equality and so forth.

This research has confirmed a strong leaning in IA toward an understanding of risk as a prerogative of experts who, as Hacking recounts, "possess the science in numbers" (Hacking, 2006:7). Notwithstanding the importance of a realist interpretation for risk analyses, I have argued that this approach tends to neglect the human dimensions of risk, and in doing so the evaluative dimension of impact significance. Alternative social, psychological and cultural theories point to a contemporary 'phenomenon of risk' encapsulating an array of social and cultural facets. When considered in conjunction with a discourse perspective, the lens of these alternative theories reveal how different understandings of risk compete with the prevalent realist interpretation in IA.

**A social perspective**

In exploring risk as a social phenomenon, I have applied Ulrich Beck's theory of the risk to a case study of a specialist risk analysis for a bulk fuel storage depot in Cape Town harbour. As described in Chapter 6, the specialist study sits at the core of the IA. Such studies tend to rely on discipline-specific precision theory to generate the knowledge that contributes to the evidentiary basis for recommendations in the IA.

I draw on this example to demonstrate how a realist interpretation of risk is embedded in the most fundamental component of the IA. Whilst the study focuses on health and safety risk, what it shares with other types of specialist investigations is a reliance on statistical analysis of the past to anticipate the likelihood and severity of future events. Confidence in such predictions underpin the institutional thresholds, rules and conventions which have been established to manage the social effects of risk. What the case study reveals is a tenuous and questionable connection between such prescripts, and the actual safety and well-being of communities. Close examination of the specialist report shows that accuracy in the numbers belies a reliance on assumptions to compensate for deficiencies in knowledge: a tendency which has been decried in Beck's risk society theory, and criticised by several scholars including Jasanoff (2012), Wynne (2002) and Duncan (2013).

Although deficiencies and gaps are acknowledged in the specialist report, these admissions tend to be couched in 'risk-speak' which excludes public stakeholders from engaging in debates about their veracity. The implicit strategy is one of imposing a measure of risk on certain sectors of the population, so that the majority can enjoy the benefits of technology. A de-humanising approach by which people are apprehended as undifferentiated and interchangeable, creates a barrier behind which specialists perform their analysis without direct engagement with the prospect of real suffering. As Douglas (1990), and Slovic and colleagues (2007) have underscored, it is only in the aftermath of harmful events that victims have names and faces, and blame is allocated to agents. As shown in the Chapter 6 case study of the bulk fuel storage facility, the strength of the numbers also cannot counter other strategic 'power-plays', which take precedence over the fundamental safety and well-being of directly affected

communities. Consequently, realist interpretation both pre-empts and demotes stakeholder opinions and values that ought to be included in impact significance determination.

#### A psychological perspective

The lens of the psychometric paradigm focuses attention on risk perception and what has been called the 'expert-layperson divide'. The psychometric risk factors at the core of this theory provide insight into what may induce comfort and what may provoke outrage. Since its initial formulation, psychological theory has been expanded to take cognisance of heuristics, amplification effects, and a role of emotions in choosing what type of risks are more, or less significant.

The case study of the Nuclear-1 EIA is a prime example of what can happen when a scientific innovation, already highly stigmatised, is coupled with untenable political motives. Although this case is unique to a particular time and set of circumstances, as Hecht (2010) has established difficulties in conducting an IA for nuclear power generally entails 'exceptionalism'. What the psychometric paradigm demonstrates is how nuclear technology is distinguished by its many 'dread' factors. Notwithstanding the application of a thorough consultation process, there is a disposition among stakeholders to oppose nuclear technology.

Whilst the engagement process for the EIA for the nuclear power station recognises and accounts for the psychological perceptions of nuclear energy, it conflates the aims of risk communication with the aims of public participation. Scholars, including Hayenhjelm (2007) and Lupton (2013b), have warned against this conflation, given that risk communication techniques are designed to overcome psychological pre-dispositions, rather than create safe spaces for constructive engagement. Evident in the nuclear case study is how efforts to persuade the public about the merits of nuclear energy, steers the public participation process away from principles of inclusion and equity. Needless to say, it is these principles that are core to the evaluation of impact significance.

Critics have identified neglect of social and cultural influences on risk perception as a shortcoming of the psychometric paradigm and associated communication techniques. Such influences include group dynamics, ethnicity, inequality, worldviews and so forth (Douglas, 2002; Lupton, 2013b). Highlighted in the case of nuclear power are the complex moral debates linked to the politicisation of risk, against the backdrop of the wider energy crises and the pressure on government to provide viable solutions to a problem of its own making. Applying the lens of psychological theory in these circumstances, reveals how efforts to quell controversy on the part of the IA practitioners are met with efforts to amplify the debate about nuclear by affected stakeholders. Exemplified in the resultant arguments is how the realist definition of risk competes with wider constructionist views rooted in the multifaceted phenomenon of risk.

#### A cultural perspective

A deeper explanation for how alternative meanings of risk are constructed and maintained among groups of individuals is offered by cultural theory and the associated grid-group typology. Key concepts underpinning the theory include the demarcation of distinct 'worldviews' and how these are implicit in shaping attitudes towards risk, particularly in relation to establishing boundaries and 'othering'.

The case study of hydrofracking for shale gas underscores the usefulness of cultural theory for understanding how knowledge is shaped within the bounds of people's allegiances to a particular worldview. Importantly, cultural theory draws attention to 'the public' as a heterogenous entity – bearers of different values and knowledge, raising the challenge of "how to deal with this plurality in principle and also practically" (Connelly & Richardson, 2005:395). Thus, unlike the social and psychological perspectives, cultural theory does not distinguish experts from lay stakeholders. Instead, it encourages a perspective whereby all those involved in the debate bring ideas, opinions and attitudes to risk that have been nurtured and shaped by factors external to the IA process.

In the hydrofracking case, the debate culminating in the production of the SEA is particularly conducive to the lens of cultural theory and the associated grid-group typology, featuring near prototypical examples of entrepreneurial, egalitarian, and hierarchical attitudes. The case study shows how competition between these perspectives fuels debates over the merits and demerits of shale gas mining. In response the SEA makes a worthy contribution to expanding the knowledge base for decisions about hydrofracturing. Notwithstanding the professionalism and merits of this scientific study, underscored in the descriptive dimension of the case, are the inadvertent ways in which the realist interpretation of risk is mobilised. A reading *against* the text in the description of the proposed activity and the affected environment, invites consideration of the extent to which power can penetrate wonted discourse and styles of communication. Attention is directed at habitual and hierarchically aligned ways in which information is framed, where boundaries are imposed, the way in which these are 'patrolled' through discursive practices; and how certain knowledge claims are privileged over others. Of all three alternative theories presented, cultural theory is arguably the most insightful in relation to the pluralism underscoring the value dimension of impact significance.

## An informal heuristic for understanding competing constructions of risk

Via a combination of conceptual and empirical analysis, I have built an argument for risk as a social, psychological and cultural phenomenon. Underpinning this argument are the three requisite features of risk, established in Chapter 3. These include potential for harm, something of value and the need for a strategy. It remains to highlight ways in which my appraisal of risk can be of practical value to the IA discipline; considering key challenges identified at the outset in respect of the relationship between impact significance, stakeholder values and power relations. My recommendation is not for the probabilistic definition of risk to be replaced, but instead for it to be complemented and extended via a simple mental heuristic for the practice of IA: focus on potential for harm, define the object/s of value and recognise the strategies in 'the power game'.

### Focus on the potential for harm

The potential for harm is the requisite feature of risk that the discipline of IA is most adept at dealing with. Notwithstanding their limitations, traditional scientific methods and probability theories are useful and necessary for identifying the likelihood and severity of harm. As explained above, what risk society theory highlights in this respect are the institutional arrangements for normalising the prospect of harm and its distribution across society. In changeable circumstances, the IA discipline should resist the temptation to ascribe harm to one or other side of a generic threshold or criteria. Over-emphasis on 'what the numbers tell us' suggests to stakeholders that their voices carry less weight. When there is bias towards quantification in determining impact significance, there is an accompanying tendency towards obfuscation and science-speak: power relations are entrenched, and dialogue is likely to breakdown more quickly into unproductive patterns of stonewalling or accusation.

An important step in attending to harm is to curb a tendency to seek "win-win" solutions and to avoid communicating in a manner that promotes this idea. In most situations "win-win" is a misnomer for IA. The co-operation, compromise and participation required for communicative rationality does not align with the focus of IA on proposals and developments that have potentially significant environmental effects. It is, consequently, preferable to anticipate conflict, focus on the potential for things to go wrong and to be explicit about such possibilities – bearing in mind that fear can be more conducive to problem solving than a paralysing state of anxiety. Facing up to how negative outcomes may occur and who will be most severely affected means that ongoing conversations and resources can be targeted towards the most vulnerable sectors of society. Such an approach aligns to the overarching point of risk - to overcome the odds.

### Define the 'object/s of value'

It is usual for IA consultation processes to start with an explanation of what is intended, but then fail to get to the point of discovering what people care about. This

is despite the latter being a critical source of input to the evaluative component of significance determination. Implicit in the word risk is something tangible or intangible, worthy of either gaining or protecting. In the IA discipline there is a tendency to collate values and categorise these under generic headings, such as "air quality", "groundwater", "biodiversity", "heritage"; "sense of place" and so forth. More directed conversations need to be had about what is meaningful (i.e. significant) to stakeholders and why. Whilst "air quality" may be a risk in the text of the IA report, in the home of a stakeholder close to a power station, risk is a child struggling to breathe. Whilst groundwater may be a risk for a geohydrologist, for the Karoo farmer risk is the prospect of losing a herd that drinks from a contaminated well. In respect of these examples, it is clear how risk can manifest in the personal confrontations of daily life, as well as the big events that affect entire communities. Through a resolute interrogation of what constitutes value in project specific settings for IA, other marginalised or taken-for-granted enquiries come into clearer focus: What types of knowledge counts in determining significance? How is this knowledge translated into the EIA? Who may benefit from the 'problems' and who from the 'solutions'?

In politically and morally contested situations, intuitive and anecdotal knowledge is shaped around value. In engaging stakeholders, the IA should not discount any of the many sources of knowledge that stakeholders rely on to gauge the potential effect of harm on what they care about the most. In some cases, as shown in the example of the nuclear power station EIA, non-scientific sources may also be disposed towards truth. Practitioners need to see this as a stumbling block, particularly if new information may come to light during the process that detracts from the integrity of a project, intensifies vulnerabilities or compromises on assurances made to stakeholders. In such instances, it may be necessary to stop and re-assess. As part of this re-assessment the source, merits and distribution of power needs to be considered. What scholars in the field of the sociology of scientific knowledge have also stressed, is that all sources of knowledge are valid, and in respect of IA, ought to be acknowledged, probed and treated as value-adding, particularly for the determination of impact significance.

**Recognise strategy as modus operandi**

Going back to its roots in maritime trade, strategy is an implicit feature of risk. In respect of IA, strategy refers to habits and principles that determine how people manoeuvre and engage tactically with the assessment process. The inclusion of strategy in the risk diagnostic is a reminder for the IA discipline that all stakeholders will come with a plan to advance their intentions, highlight their priorities or express their needs. Cultural theory provides useful insight into the relationship between strategy and world views.

In the practice of IA it is helpful to recognise that the rational scientific procedure's claim to impartiality is in itself a strategy – one that is implicit in the hierarchical world view inherent in IA as an institutional instrument for decision making. Findings in my case studies reinforce Richardson's (2005) assertion that information introduced into IA is strategically 'conditioned' by power when political support already exists for a proposal.

In subscribing to a realist notion of risk, the IA discipline is also endorsing the power of the rational model to anticipate outcomes. This research highlights how power can be borne out of allegiances, and 'othering' of solidarities that do not conform to a similar worldview. As several critics have indicated, the validity of the rational model for IA is tested by alternative modalities of power. As especially evident in the nuclear case study, strategy deployed by stakeholders to claim more power is generally a recourse to protect value. In these circumstances, the 'value-neutral' and realist discourse becomes vulnerable - susceptible to being over-powered by other sources of knowledge and wisdom. In the IA discipline, such struggles must be seen as necessary in situations where political aspirations, or self-fulfilling motives of private enterprises should be restrained.

The case studies in this thesis highlight the strategic underpinnings of discourse in situations where value is at stake and trust is lacking. As I have suggested previously, IA practitioners ought to expect conflict. The deployment of strategy by actors in the process begins long before demands for reviews, appeals against unpopular decisions

or litigation between parties. Recognising the potential for conflict does not mean that counter-strategies ought to be devised to strengthen one's own position. Rather, it needs to be appreciated that strategy is inherent in cultural dispositions and will be instrumental in struggles over both the meaning of risk and the determination of significant impacts.

## Final reflections

In introducing the conceptual framework for my research, I quote a US Judge who drew a comparison between words and chameleons. Whilst summarising the learning from my research for this final chapter, an article appeared in my inbox about the Chapmans pygmy chameleon (Tolley, 2021). I learned from the article, that the range for this species is restricted to one rapidly diminishing forest in southern Malawi. Sadly, it seems too late to save this creature from its journey to extinction.

The plight of the pygmy chameleon underscores how poorly we have protected the habitats for vulnerable species, whilst effectively cultivating an environment in which risks are permitted to thrive. We are nowadays so immersed in risk, we are barely conscious of the innumerable risk-based decisions we make on a daily basis. Quite profoundly, in a world struck by a deadly pandemic, some of the most predictable, routine and comforting habits have become the most dangerous. Whilst the exact cause of the COVID-19 outbreak has not been confirmed, either source - be it a food market or laboratory - is a consequence of the exploitation or manipulation of natural systems. The enormity and severity of the pandemic have not shielded us from other disasters in the interim – the jamming of ship in the man-made Suez Canal (March 2021); devastating wildfires across Australia (November – December 2019) and parts of the US (October – November 2021); the Uttarakhand dam disaster in India (7 February 2007); the explosion of decaying fireworks in a warehouse in Beirut (4 August 2020); the burning of a chemical storage facility in Durban (13 July 2021) resulting in South Africa's worst environmental disaster in decades. And as leaders of nations, large and small, gather to address climate change risks at the Conference of Parties (COP26) (31 October 2021 – 12 November 2021), we are confronted with a stark depiction of the relationship between risk, fairness, and power.

These events are testimony to a character and scale of potential environmental harm that cannot be conceived in terms of probability theory alone. As indicated in my preface, realist interpretations do not adequately cater to the politics of risk that ultimately influence the significance of potential impacts - human greed, error or lack of judgement. Innovative approaches mentioned in Chapter 2, including, among others, Taleb's Black Swan theory, Ravetz's post-normal science, Cilliers's complex systems theory, are directed at the limitations of realist conception of risk. Yet the idea that risks, both small and large, can be captured in a framework of probability and consequence remains dominant in the practice of IA. Arguably this is because, as one my interviewees has stated, there is nothing else on offer.

What I have synthesised for the IA discipline in this thesis is how philosophers in the humanities, like their counterparts in the 'hard' sciences, have attended to the subject of risk. Whilst analysts have worked at honing predictive technologies to make more reliable forecasts, philosophers, psychologists and sociologists have, over the years, sought to understand how people respond to the unforeseen and the unknowable. As demonstrated in this research, these contributions have a much to offer what, *inter alia*, Morgan (2012), Lawrence (1997) and Weston (2010) have identified as a necessary and ongoing theory-building endeavor for IA - an effort needs to focus particularly on the evaluative component of impact significance.

A persistent challenge for practitioners 'at the coal-face' is how to incorporate new ideas and innovations from both the realist and constructionist ends of the risk continuum in their day-to-day activities. Marrying the rationalisation of risk to the values and expectations of stakeholders is fraught with complexity. To sum up my contribution, I offer the following key messages in support of a different way of thinking about risk for IA:

- Risk should no longer be viewed as a matter for expert analysis alone
- Over time and with increasing levels of uncertainty, the meaning of risk has evolved, from a mathematical formula into a social, cultural and psychological phenomenon

- Alternative theories of risk are many and these can be positioned on a continuum from highly realist to highly constructionist
- The abstract qualities inherent in risk as a phenomenon avails it to appropriation by different stakeholders depending on their needs and priorities
- Whilst risk appropriation can manifest in struggles, the nature of such appropriation is not arbitrary: it accords to a diagnostic that includes the potential for harm, an object/s of value and the need for a strategy (to protect value from harm)
- Risk theories, including the risk society, the psychometric paradigm and cultural theory are useful for explaining how the risk diagnostic is operationalised by diverse stakeholders in the consultative process.
- Alternative ways of knowing about risk is not intended as a substitute for the calculation of probabilities in IA but rather as an extension thereof, thus making an important contribution to evaluating significance.

As this list suggests, defining risk is, in and of itself, an exercise in power that operates in between the prediction and manifestation of harm. Once something happens, the power that initially sits with experts and decision-makers is supplanted - the emphasis shifts to blame and recrimination. When the dust has settled, scientists will search for lessons, but affected stakeholders will hold onto the memories. In a changeable and volatile world, cycles of mishaps, accusations and outrage are likely to continue. Arguably those involved in the discipline of IA can only make a difference on a project- by-project basis. However, given the importance of the IA instrument as an environmental planning and management tool, there is an onus on the discipline to recommend appropriate solutions, as well as build trust with individuals and communities whose health and well-being hang in the balance.

My recommendation for a deeper understanding of risk is offered at a precarious stage in the evolution of the IA discipline. David Bancroft, current chair of IAIA has warned how the COVID-19 pandemic exposes the vulnerability of IAs to becoming 'ticket items' that cannot demonstrate their value proportionate to their cost. Testimony to

Bancroft's concerns is the number of jurisdictions (including Australia, Brazil, Canada, India and the US) which have either reduced IA requirements or struck them off their law books altogether. A persistent need for the South African government to balance socio-economic development and job creation, with environmental protection, will undoubtedly sustain pressure on the IA discipline to show its worth. Given the effects of climate change, forecasting difficulties will be magnified in years to come. Whilst the scientific bases for predictions becomes increasingly unreliable, the insights contributed by this research into competing constructions of risk can better equip the discipline to engage with an incalculable future.

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