**ENHANCING PERFORMANCE-BASED
REGULATION: LESSONS FROM NEW ZEALAND'S
BUILDING CONTROL SYSTEM**

Peter John Mumford

A thesis

Submitted to the Victoria University of Wellington

In fulfilment of the requirements for the degree of
Doctor of Philosophy

Victoria University of Wellington

2010

Abstract

Performance-based regulation establishes mandatory goals rather than enforcing prescriptive standards. Performance-based regulation has become popular over the past two decades as an alternative to prescriptive regulation, as it holds out the promise of simultaneously achieving health, safety and environmental outcomes while facilitating innovation and reducing regulatory costs.

In the early 1990s New Zealand adopted a performance-based building control regime. This demonstrably failed and was replaced in 2004 with a new regime, still performance-based but more conservative. Using legal determinations, adjudications and court cases, and reviews of the failures, contributing factors have been identified. An assessment has been made of the extent to which these factors can be attributed to the performance philosophy and features of the regime. Strategies to address the weaknesses of performance-based regulation have been explored.

The change from a standards-based regulatory regime, where technology shifts are on the margin and occur through a process of incremental trial-and-error, to a performance-based regime, displaced traditional institutions for aggregating knowledge required for risk-based decision-making. At the same time, the new performance-based regime was permissive of greater technology shifts, which demands more of decision-makers who are operating in an environment of inevitable uncertainty. The significance of the regime change was not well understood and new institutions did not evolve.

Reverting to traditional institutions is not an option as they are inherently conservative and therefore innovation as one of the normative benefits of performance-based regulation is likely to be constrained. New institutions are required to aggregate knowledge, but also permit decisions that enable the technology threshold to be pushed out in situations where it is not possible to measure accurately how a novel technology will perform in all of the circumstances of its use, and failure in the field is a possibility. This requires knowledge that is both technical and evaluative. Technical knowledge is more than science, but increasingly

knowledge in other domains such as psychology, economics, and both domestic and international law. Evaluative knowledge is that which is required to assess risks and consequences.

This study explores two strategies for resolving the challenges of decision-making in a permissive performance-based regulatory environment: improving the predicative capability of decision-making systems through the better application of the intuitive judgment associated with expertise and wisdom, and treating novel technologies as explicit experiments. Both strategies show promise, but may be difficult to implement. If the conditions for materially pushing out the thresholds of technology while managing the risks cannot be met, it may be necessary to revert to incremental trial-and-error in high-risk areas. This does not preclude innovation, but it will be at a slower rate.

Acknowledgements

I would like to express my deep appreciation and thanks to my two supervisors, Dr Amanda Wolf and Professor Gary Hawke. Dr Wolf not only guided my intellectual pursuit, but through her enthusiasm and encouragement sustained me over the many times when I was faced with reconciling the competing demands of work and study. Professor Hawke provided wise counsel at critical stages of my research.

I would like to thank the Ministry of Economic Development, where I work in the area of regulatory policy, for its generous support. I would like to express my particular appreciation to Christine Jamieson who, as the Ministry's knowledge advisor, accommodated my many requests for books and articles over a period of more than five years, and generally supported me in my research.

I would like to thank Barry Brown and Dr Lam Pham, both of whom provided key insights into performance-based regulation in the building sector and the 'clues' that ultimately directed much of my research. I would like to acknowledge an internal discussion document prepared by Mr Brown while he was Chairman of the Building Industry Authority, entitled *Evaluation of Alternative Solutions*, and provided to me as a personal communication. This discussed the challenge of evaluating alternative solutions from the perspective of a professionally qualified and experienced person in a professional practice as a consulting structural engineer who concurrently held the position of a regulator in a performance-based building control environment, and who had the hands-on responsibility for determining matters of code compliance and other matters relating to building controls.

There are a number of other people and organisations I would like to thank: Professor Russell Kenley, who suggested that I use Weathertight Home Resolution Service (WHRS) cases as my data source; the Crawford School of Government, Australian National University, where I spent a month in 2006 as a Visiting Scholar, and academics from both the Crawford School and Regulatory Institutions Network (RegNet) who gave me their time; both staff and students of the School of Government, Victoria University of Wellington, who provided useful

feedback on my research at various stages; and to Victoria University for the award of the Laurie Cameron Scholarship in 2006.

Finally, I would like to express my gratitude to my wife Kim-Anh, and my children Nikolai, Jonathan and Patrick, for the many years of support they have given me.

Table of contents

Abstract	3
Acknowledgements.....	5
Table of contents.....	7
List of figures	12
List of tables	12
Glossary of abbreviations.....	13
Chapter 1: The context for the research question	15
Introduction	15
The leaky-building crisis	16
Changes in the building environment	17
Changes to the regulatory environment	20
Performance-based regulation a general phenomena.....	22
Description of the Building Act 1991	26
Performance of the Building Act 1991	29
2004 building reforms	31
The ‘case’ that is being examined.....	35
Chapter 2: Methodology	37
Research question	37
Methodological heuristics	39
Explaining failure.....	43
Literature review	45
Data gathering	46
Data ordering	47

Data analysis.....	50
Strengthening the regime	53
Experts	53
Experiments.....	54
Chapter 3: Drivers for performance-based regulation and its limitations	55
Background	55
Characteristics of the regulatory state.....	55
Sources of regulatory failure	61
Categorization of failures into main types	61
Sources of failure in command and control regulatory regimes	67
Problems with traditional command and control.....	68
Problems with performance-based command and control.....	69
Conclusion.....	72
Chapter 4: What factors contributed to dwellings failing to perform as expected?	75
Background	75
Introduction	75
First iteration: determinations	78
Introduction	78
Background to determinations.....	78
Standards of workmanship	79
Standards of maintenance.....	81
Second iteration: adjudications and court action.....	82
Introduction	82
Background to adjudications and court action	83
Assignment of liability.....	84

The case against builders, developers and territorial authorities	85
An informed judgment required when exercising duty of care	86
A distinction between liability and responsibility	93
Interim conclusions based on first two iterations	98
Third iteration: the two reviews.....	100
Introduction.....	100
Background to reviews.....	101
Building sciences	102
A lack of science	103
A lack of risk-based judgments	105
Who contributed what to the failure	107
Conclusion.....	110
Chapter 5 – What role did performance-based regulation play?	115
Introduction	115
Analytical framework.....	116
From conception to administration	117
Background.....	117
The evolution of goals – a fundamental shift or a change of emphasis?	119
Standards setting and approvals – extending the scope for discretion.....	127
Responsibilities and accountabilities - reversing the pyramid	130
Conclusion	133
Comparison of standards-based regulation and performance-based regulation.....	136
Background.....	136
General description of standards-based regulatory regimes.....	138
Standardisation vs. uniqueness	140

Summary	145
Conclusion.....	147
Risks inherent in performance-based regulatory regimes	147
Managing the risks while achieving the normative benefits of PBR	149
Chapter 6: Expertise and wisdom.....	153
Background	153
Introduction	154
Sources of uncertainty	155
The difficulty of calculating ‘acceptable risk’	156
Managing multiple objectives	158
Responses to uncertainty.....	163
The role of expertise and wisdom	166
Introduction	166
Expertise.....	166
Wisdom	176
Summing up on expertise and wisdom	179
The role of nonexperts	181
Nonexperts as a source of data	182
Nonexperts as a source of information on acceptable risk.....	183
Nonexperts as experts	184
Nonexperts as a source of wisdom	184
Non-judgment reasons for public participation	185
Conclusion.....	186
Aggregating knowledge	187
Conclusion.....	190

Chapter 7: The case for explicit experimentation and its limiting conditions.....	193
Background.....	193
Introduction	194
The case for experimentation	196
The normative argument.....	196
The rational calculation argument.....	198
The learning argument.....	200
Summary.....	201
Forms of experimentation	202
Introduction.....	202
A market-based approach.....	202
Informal experimentation – experts-driven	204
Informal experimentation – regulator-driven	205
Explicit experimentation - overview	207
Explicit experimentation in the United States	208
Experience with explicit experimentation in the United States.....	211
Mandate	211
Internal alignment	215
External engagement	219
Summing up on the four approaches to experimentation.....	222
Conclusion.....	224
Chapter 8: Conclusions, implications for policy and future research.....	229
Conclusions	229
Implications for Policy	234
Introduction.....	234

Legal framework.....	234
Institutions	238
Conclusion.....	240
Future research	241
Bibliography.....	244

List of figures

Figure 1: Nordic Model, with reference to NZ building code requirement E2 External Moisture	28
Figure 2: Simplified description of New Zealand's post-1991 building control regime.....	29
Figure 3: Tiers of decision-making (with indicative behaviours)	49
Figure 4: Sources of regulatory failure	61
Figure 5: A simple picture of why dwellings failed	82
Figure 6: A more complex picture of why buildings failed	98
Figure 7: A framework for comparative analysis	117
Figure 8: Extending the scope for discretion	130
Figure 9: Reversing the pyramid of responsibility	133
Figure 10: Decision-making under uncertainty (version 1)	149
Figure 11: Decision-making under uncertainty (version 2)	187

List of tables

Table 1: Chronology of events leading to promulgation of Risk Matrix	91
Table 2: Behaviours contributing to building failures	108
Table 3: The evolution of goals.....	127
Table 4: Comparison of standards-based and performance-based regulatory regimes	138
Table 5: Decision-making within the framework of performance-based regulation	160
Table 6: Relationship between regulatory regimes and experimentation.....	222

Glossary of abbreviations

BIA	Building Industry Authority
BIC	Building Industry Commission
BRANZ	Building Research Association of New Zealand
DBH	Department of Building and Housing
DIA	Department of Internal Affairs
EPA	Environmental Protection Agency
GAO	U.S. Government Audit Office
IANZ	International Accreditation New Zealand
MED	Ministry of Economic Development
ORPBC	Office of the Review of Planning and Building Controls
TBT Agreement	WTO Agreement on Technical Barriers to Trade
WBSG	Weathertight Buildings Steering Group
WHRS	Weathertight Homes Resolution Service

Chapter 1: The context for the research question

Introduction

One of the tasks of government is to protect people. One of the main ways they do this is through passing laws, both statute (enacted by parliament) and regulation (where law-making is delegated to Cabinet, ministers or officials). Therefore, a statute that purports to: ‘Safeguard people from possible injury, illness, or loss of amenity in the course of the use of any building’,¹ and a regulation made pursuant to the statute that: ‘*Buildings* must be constructed to provide *adequate* resistance to penetration by, and the accumulation of, moisture from the outside’,² will create a reasonable expectation by the community that they will be protected from badly leaking buildings.

At one level a wholehearted faith in governments to protect people is naïve, and most people know this. Hence, the expectations of the community are tempered by what is generally considered to be reasonable. Buildings do leak and governments are not called to account on each and every occasion. But in some circumstances there can be a clear difference between what the law delivers and what the community expects it to deliver. In such cases the law could be considered to fail, and this invites an enquiry into the circumstances of the failure and the identification of remedies.

My thesis is one such enquiry. It was precipitated by the so-called leaky-building crisis which engulfed New Zealand from 2002 to 2004, and still has major repercussions today. What makes this enquiry particularly interesting is that the failure might have resulted from the adoption in New Zealand of a novel regulatory philosophy, namely performance-based regulation and, if so, the findings of this enquiry could have implications for this now popular philosophy in New Zealand and other countries. This thesis addresses a gap in the body of knowledge on performance-based regulation that has been described by Coglianese *et al* as

¹ Building Act 1991, s6(2)(a).

² Building Regulations 1992, SR 1992/150, schedule 1, E2.2.

follows: ‘Despite growing interest in the performance of government regulation, researchers have yet to subject performance-based standards to close empirical scrutiny. There has been relatively little study of how performance-based regulation works in practice across different regulatory settings.’³

This is not a historical account of either building regulation or performance-based regulation, nor does it provide a full account of the events and aftermath of the leaky-building crisis. But some background is required to provide a context for, and demonstrate the value of, this enquiry. My introductory chapter provides this. Subsequent chapters seek to answer a number of questions: Why did builders build thousands and thousands of homes that leaked causing rotting and resulting in billions of dollars in damage? To what extent can this be attributed to a failure of the law, and to the fact that the law was performance-based? What is the best way to resolve the problems that have been identified with the law?

The leaky-building crisis

In 2002 a leading New Zealand newspaper, the *New Zealand Herald*, ran a series of articles that exposed widespread rotting of a popular style of housing, newly adopted in New Zealand in the mid-1990’s, known as monolithic-clad or Mediterranean-style. Feeding the media interest were the expert views of the principals of a building survey company, Prendos, who assumed an activist role, continually drawing attention to their concerns. Labelled the *leaky-building crisis* by the media, a number of different parties were significantly affected: homeowners who faced heavy remedial costs, and in some circumstances stress, physical dislocation and health risks; the Building Industry Authority (BIA) and territorial authorities, as regulators of building performance, as the media and others sought to make someone accountable; and the government, as it came under increasing pressure to first acknowledge, and then fix, the problem.

The response to the crisis was rapid, with a number of events happening in parallel. In February 2002 the BIA appointed an independent group, the Weathertightness Overview

³ Cary Coglianese, Jennifer Nash and Todd Olmstead, *Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Protection* (Regulatory Policy Program Report No. RPP-03, 2002), 1.

Group (known as the ‘Hunn Committee’) to investigate the problem. The government focused on the issue in late 2002 and, in the first instance, sought policy advice on establishing a dispute resolution service to provide a low-cost avenue for home owners seeking compensation, and then transferred policy responsibility for the building control regulatory regime from the Department of Internal Affairs (DIA) to the Ministry of Economic Development (MED) and directed it to review the Building Act 1991. The Government Administration Select Committee (a cross-party standing committee of parliament) initiated its own investigation.

By the end of 2004 the Weathertight Homes Resolution Service (WHRS) had been established, the Building Act 2004 had been enacted, and the BIA had been disestablished and its role (and building policy responsibility) taken over by a new government department, the Department of Building and Housing (DBH). These initiatives reflected the high-level policy responses. Questions of liability and compensation were played out in the WHRS, and increasingly in the Courts as some plaintives (unsuccessfully) sought to hold the government, via the BIA, legally liable for the building failures.

At a high level the various analyses of the leaky-building crisis located the source of the problem in the significant changes in both the building and regulatory environments in New Zealand in the 1990’s, precipitated by the adoption of a performance-based building control regime in 1991.

Changes in the building environment

The 1971 Report of the Commission of Inquiry into Housing in New Zealand provides a potted history of the phases of residential building design and construction since the 19th century. It describes the standard New Zealand house of the time as traditional and conventional: ‘Slight basic change is evidenced over the last 30 years. What this signifies is

that the form is determined largely by custom and precedent, offering little opportunity for development or innovative design.’⁴

In the 1990s this changed. Shaw’s *History of New Zealand Architecture* notes that:

Two storeyed timber-framed homes with tiled roofs and walls of textured coated cement board sheeting in pastel shades have sprung up as developers milk, among others, a profitable immigrant clientele. Characterised by double height porticos whose columns are invariably made of spray-textured plastic or concrete piping with polystyrene detailing, the architectural vocabulary of such houses has arrived in New Zealand from the Mediterranean via California. Despite their hollow grandiosity, they are rapidly becoming the nineties equivalent of the ubiquitous brick and tile of the sixties.⁵

The Hunn Committee also noted this change: ‘Overseas imagery and changes in lifestyle aspirations have led to consumer preferences for buildings that adopt a “Mediterranean” appearance of plaster and adobe finishes. Typically, the style can be identified by its flush plaster finishes, lack of eaves, use of parapets and with balconies both internal and external to the building’s principal form.’⁶ The Hunn Committee also draws attention to the rise in popularity of multi-unit or condominium buildings, rather than the stand-alone houses described by Shaw.

Changes to the building environment were not limited to the design of structures, but also to construction materials and methods. Monolithic cladding systems became increasingly common. These systems comprise sheets of polystyrene or cement board plastered over and attached directly to, typically, wooden framing. A particular feature of the new systems was the use of sealants to create a watertight seal at the joints. While stucco (a form of monolithic cladding) was one of the traditional forms of cladding in New Zealand, what changed were the

⁴ Commission of Inquiry into Housing in New Zealand. *Housing in New Zealand* (Wellington: New Zealand, April 1971), 134.

⁵ Peter Shaw, *A History of New Zealand Architecture*, 3rd ed. (Auckland, NZ: Hodder Moa Beckett, 1997), 220.

⁶ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 8.

scale of use and the range of cladding systems available.⁷ In addition, in 1998 there was a change to the New Zealand standard for timber treatment, which allowed the use of kiln-dried (untreated) framing, rather than the traditional chemically treated timber.

The approach to designing and constructing a standard ‘one-off’ New Zealand house also changed in the 1990’s, having been relatively unchanged for more than a century.⁸ The traditional approach was described by the Hunn Committee as follows: ‘An intimate professional relationship prevailed between the owner, designer and builder. There was a tacit sharing of responsibility between all three. The builder might provide warranties or guarantees. The architect took responsibility for design and supervision’.⁹ The Hunn Committee also described the builder workforce as relatively stable and skilled, and which took both responsibility for and pride in the completed building. The alternative to one-off houses was group housing, also described by the Hunn Committee as ‘traditional’ and ‘conservative’.¹⁰

The new approach, and one adopted widely in relation to monolithic-clad buildings, was property developer-driven. Rather than the intimate relationship described above, this approach could be conceived of as a web of contractual relationships where architects, main contractors, project managers and sub-contractors form and reform to design and build buildings that are marketed by the developer, the effect being that: ‘. . . there is often a multitude of “labour-only” sub-contractors engaged which means that the sub-contractors and sub-trades, the actual workers, are often not well known to the main contractor and even less to the project manager and developer’.¹¹

⁷ Clark, Susan J., Mark Jones, and Ian C. Page, BRANZ Study Report no. 142 (New Zealand 2005 House Condition Survey, 2005).

⁸Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 8.

⁹ *Ibid.*, 8.

¹⁰ *Ibid.*, 9.

¹¹Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 9.

Changes to the regulatory environment

Regulatory controls on buildings have a long history. Various sources cite the Laws of King Hammurabi of Babylon, promulgated around 2000 B.C., which sets out standards for building construction and penalties for not meeting the standards:

If a builder has built a house for a man and his work is not strong and if the house he has built falls in and kills the householder, that builder shall be slain.

If a builder has built a house for a man, and his work is not done properly and a wall shifts, then that builder shall make that wall good with his own silver.¹²

While the Hammurabi Laws are archaic, modern building controls can still have a centuries-old tradition, as shown in Knowles & Pitt's *History of Building Regulation in London 1189-1972*.¹³ While charting a history from 1189, this book records that the birth of the Building Acts was in 1619. The Acts dealt with a limited number of building elements, including the thickness of walls, windows and shopfronts. Successive Acts and amendments followed, occasionally as a result of calamities such as the great fire of London (which led to the first comprehensive building act of 1667), but also following advances in technological knowledge, and evolving community expectations. Requirements were typically prescriptive, and over time the accumulation of additional requirements resulted in a system of building controls that was described in 1981 as: '... more cumbersome and bureaucratic than it need to be; and that the present detailed form of Regulations is inflexible for many purposes, inhibits innovation, and imposes unnecessary costs.'¹⁴

¹² Department of Health for Scotland. Report of the Committee on Building Legislation in Scotland (HMSO, October 1957), 38.

¹³ C. C. Knowles and P. H. Pitt, *The History of Building Regulation in London 1189-1972* (London: Architectural Press, 1972).

¹⁴ *The Future of Building Control in England and Wales* (1981), cited in Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand, May 31, 1983), Appendix 3.

A similar pathway was followed in New Zealand. Early building controls were limited to a few building elements and: ‘. . . implied concern largely with fire safety’.¹⁵ The 1931 Hawke’s Bay earthquake and resulting fire, which destroyed the central business district of the town of Napier, provided the impetus for the development of a much more comprehensive set of controls.¹⁶ These controls also aimed to achieve some uniformity across the country in an area of law that traditionally was regulated at the local level. The result was a model building code, first published in 1935. Successive revisions followed, and it was reported that the 1964 revision had been adopted by almost all local authorities.¹⁷

By 1971 the Commission of Inquiry into Housing in New Zealand was able to conclude that: ‘. . . the general standard of construction is reasonably high’ and: ‘Nor is it likely, under the present system of controls, that a dwelling which is structurally weak or lacking in the basic environmental qualities needed for physical health can any longer be built in New Zealand.’¹⁸ This was attributed to the strict application of building controls which meant that: ‘. . . the overall quality of the house as a shelter cannot depart far from what has been described’.¹⁹

By the end of the 1970’s the building industry was reacting against what it saw as the heavy hand of regulation, and in 1982 the government appointed a two-person team to undertake a review of planning and building controls. The Office of the Review of Planning and Building Controls (ORPBC) issued a discussion document in 1983. The introductory letter from the Minister of Finance noted that it was in response to the representations of professional institutions and industry representatives that the industry is: ‘. . . over-regulated and

¹⁵ Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand. May 31, 1983), 3.

¹⁶ Peter Shaw, *A History of New Zealand Architecture* (Auckland, NZ: Hodder Moa Beckett, 1997), 127.

¹⁷ Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand. May 31, 1983), 4.

¹⁸ Commission of Inquiry into Housing in New Zealand. *Housing in New Zealand* (Wellington: New Zealand, April 1971), 126.

¹⁹ *Ibid.*

controlled’.²⁰ The discussion document was wide-ranging, covering most if not all of the various dimensions of building controls. It made no recommendations as such, but provided direction for further work, described as ‘tasks’ and ‘possibilities’.

One of the tasks was the preparation of a national building code as a performance-orientated document.²¹ In proposing this task the ORPBC noted (citing a paper on what was happening internationally):

Requirements are increasingly being specified in performance terms. The development of performance based requirements is dependent on the availability of satisfactory methods of specification, assessment and tests, and of appropriately skilled personnel and facilities. It is therefore a slow, continuing process rather than a rapid, once for all, operation.²²

On the basis of the discussion document the government decided to reform building controls, including adopting a performance-orientated national building code. In May 1984 the ORPBC issued a second discussion document as a contribution to the design of a new building control regime.

It was not until the late 1980’s that the work was significantly advanced, this time by the Building Industry Commission (BIC), which reported in 1988. The BIC report provided the foundation for a new building control regime, established by the Building Act 1991, and a performance-based building code (contained in a schedule the Building Regulations 1992), which came into force on 1 January 1993.

Performance-based regulation a general phenomena

New Zealand followed international trends, but as an early adopter of performance-based regulation. An international chronology is provided by Meacham. He notes that: ‘Beginning

²⁰ Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand. May 31, 1983).

²¹ *Ibid.*, 98.

²² *Ibid.*, 15.

with the British and Japanese in the mid-1980's, and gaining worldwide attention through the Warren Centre Report from Australia in the late 1980's, the move towards minimizing prescriptive constraints and maximizing design flexibility in building codes has become increasingly widespread'.²³ He records that the UK published its Building Regulations for the first time as a performance-based document in 1985, with New Zealand's building code coming into force in 1992²⁴ and Australia's code being drafted in 1995.²⁵

What was happening to building controls in the 1990's was part of broader search for more effective and efficient regulatory approaches. The promotion of performance-based regulation was one of the favoured approaches, along with other market-orientated approaches involving economic instruments and self-regulation, rather than state-orientated approaches typically described as command and control regulation (a generic term used to mean the setting and enforcement by a regulator of prescriptive standards).

The normative foundations for performance-based regulation were, however, under development for some time, as can be demonstrated with reference to both building controls and occupational health and safety, areas which have a long-standing regulatory tradition. For example, the *Report of the Committee on Building Legislation in Scotland* (1957), reflecting on the rigidity and inflexibility of the present system of building controls, recommended that: '... the regulations should continue and extend as far as possible the practice of laying down requirements by way of technically expressed performance standards in respect of each function, rather than by a rigid specification of what is to be done.'²⁶ This report in turn referred to a 1936 report by the Building Research Board that stated performance-based

²³ Brian J. Meacham, *The Evolution of Performance-Based Codes and Fire Safety Design Methods* (NIST GCR 98-761. NIST: Gaithersburg, MD, 1998), 1.

²⁴ Actually 1 January 1993.

²⁵ Brian J. Meacham, *The Evolution of Performance-Based Codes and Fire Safety Design Methods* (NIST GCR 98-761. NIST: Gaithersburg, MD, 1998), 2-3.

²⁶ Department of Health for Scotland. *Report of the Committee on Building Legislation in Scotland* (HMSO, October 1957), 58.

regulation was the ideal.²⁷ In 1925, the U.S. National Bureau of Standards was also proposing that wherever possible building code requirements should be couched in terms of performance, thus promoting the use of new materials and new combinations of materials.²⁸

In the area of occupational health and safety the influential Robens Committee argued that: ‘. . . there is too much law’, and ‘. . . the attempt to cover contingency after contingency has resulted in a degree of elaboration, detail and complexity that deters even the most determined reader’.²⁹ The Committee recommended a legal framework that provided both a clear statutory statement of over-riding duties, and: ‘. . . wherever practical, regulations should be confined to statements of broad requirements in terms of the objectives to be achieved.’³⁰

While the case for performance-based regulation was often made on the basis of facilitating innovation and reducing regulatory costs, the idea that complex prescriptive regulation could undermine safety outcomes also emerged. One argument, which was articulated in the report of *The Public Inquiry into the Piper Alpha Disaster* (1990), was that enforcing detailed rules results in a culture where compliance with the rules becomes the primary objective, rather than an overall goal such as safety. As a result individual responsibility and initiative is reduced, and innovation and continuous improvement is stifled.³¹ Another argument was that prescriptive regulation can inhibit the adoption of novel technologies that provide greater levels of safety than extant technology.³²

²⁷Department of Health for Scotland. *Report of the Committee on Building Legislation in Scotland* (HMSO, October 1957), 57.

²⁸ Greg C. Foliente, “Developments in Performance-Based Building Codes and Standards,” *Forest Publications Journal* 50: 7/8 (2000): 3.

²⁹Lord Robens (Chairman), *Safety and Health at Work: Report of the Committee 1970-72* (London: HMSO, 1972), 6-7.

³⁰*Ibid.*, 44.

³¹ Lord Cullen, *The Public Inquiry into the Piper Alpha Disaster, Vol. 2.* (London, HMSO, 1990), 355-356.

³² Greg C. Foliente, “Developments in Performance-Based Building Codes and Standards,” *Forest Publications Journal* 50: 7/8 (2000): 12.

The view that prescriptive controls compromised the primary objectives of regulation, as well as creating an unnecessary regulatory burden, was not universal. As noted above, the Commission of Inquiry into Housing in New Zealand considered that the existing controls resulted in generally safe houses. A similar conclusion was drawn in the report on *The Future of Building Controls in England and Wales* (1981): ‘The present system of building control produces safe buildings in which fire and serious structural failure is rare. This is not in question.’³³

While performance-based regulation as an idea had a relatively long gestation period, the 1990’s was the decade where it was put into practice in a more or less systematic way. As noted earlier, New Zealand was an early adopter. In addition to the Building Act 1991, the Resource Management Act 1991, Health and Safety in Employment Act 1992, Electricity Act 1992 and the Hazardous Substances and New Organisms Act 1996, were all performance-based.

Various writers have associated the uptake of alternative regulatory approaches such as performance-based regulation with the ascendancy of the neo-liberal economic philosophy in the 1970’s/1980’s, with its emphasis on reducing the level of intervention by the state in the economy.³⁴ This is consistent with a pattern of diffusion that has the idea of performance-based regulation gaining currency amongst economic policy advisors and decision-makers in the decade or so prior to 1990, with the time it takes to formulate policy and draft and enact laws resulting in a surge of new legislation in the 1990’s. That being said, it is also clear that performance-based regulation as a viable alternative to prescriptive regulatory controls already had a provenance through the previous decades of experience, reflection and writing.

³³ The Future of Building Control in England and Wales (1981), cited in Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand. May 31, 1983), Appendix 3.

³⁴ See Peter J. May, “Social Regulation,” in *Tools of Government: A Guide to the New Governance*, ed. Lester M. Salamon (New York: Oxford University Press. 2002), 164.

Irrespective of the evolutionary pathway, it is relatively common today to argue that as far as possible regulation should be performance-based, rather than prescriptive. For example, the OECD advocates that regulations be couched in performance terms.³⁵ The WTO Agreement on Technical Barriers to Trade (TBT) also states: ‘Wherever appropriate, Members shall specify technical regulations based on product requirements in terms of performance rather than design or descriptive characteristics.’³⁶ At a national level, the *External Advisory Committee on Smart Regulation* (2004), extolled the Government of Canada to ‘. . . be more bold in its use of performance-based regulations and other alternative instruments.’³⁷ The popularity of taking a performance-based approach to regulation was such that in 2002 the OECD reported that:

The use of performance-based regulation is rapidly developing in OECD countries. Its use has been increasing significantly in relation to health, safety, consumer protection and environmental regulation in particular. According to the OECD *Regulatory Capacities Database* 11 OECD countries have increased their use of performance-based regulation in recent years.³⁸

Description of the Building Act 1991

The key objectives of the 1991 reforms were to: encourage innovation in the building and construction industry through the adoption of a performance-based building code; encourage an improvement in service quality provided by the local authorities through competition from private building certifiers; and provide a more coherent and accessible building control regime through a single building code and one-stop-shop. The Building Act 1991 affirmed that the primary purpose of the controls on buildings was health and safety, but included a number of

³⁵ OECD, *The OECD Report on Regulatory Reform Synthesis* (OECD, Paris, 1997), 28.

³⁶ WTO, *The WTO Agreement on Technical Barriers to Trade*, Article 2.8.

³⁷ External Advisory Committee on Smart Regulation, *Smart Regulation - A Regulatory Strategy for Canada* (Report to the Government of Canada. September 2004), 5.

³⁸ OECD, *OECD Review of Regulatory Reform: Regulatory Policies in OECD Countries* (Paris: OECD, 2002), 135.

provisions that sought to align the building control regimes with particular sub-objectives, such as access to buildings for people with disabilities, energy efficiency and cost-efficient standards.

Before the passage of the Building Act 1991 regulatory controls over the design and construction of buildings, both domestic and commercial, were contained in a disparate set of statutes, regulations and local-body bylaws. The administration was shared amongst a number of different authorities.

The introduction of the 1991 Act was a seminal event and reflected a fundamental shift in New Zealand's approach to building controls. New features of the 1991 Act were: a single national standard (the building code); a 'one-stop-shop' for those seeking building consents (resulting from a consolidation of building related regulatory controls in a single law); central oversight of the building control regime by an independent statutory body (the Building Industry Authority); and, building consents and building inspections carried out by both territorial authorities (local government bodies) and private building certifiers.

A key innovation was the adoption of the performance-based building code. The code was based on the Nordic Model which was adopted by many countries, but with differences in application.³⁹ The Nordic Model involves a five-level hierarchy of requirements, illustrated in Figure 1 with reference to specific provisions from the New Zealand building code.⁴⁰

³⁹ D. Beller et al., "Qualitative Versus Quantitative Aspects of Performance-Based Regulations" (Paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001), 66.

⁴⁰ Figure 1 was adapted from D. Beller et al., "Qualitative Versus Quantitative Aspects of Performance-Based Regulations" (Paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001), 67.

Figure 1: Nordic Model, with reference to NZ building code requirement E2 External Moisture

The old prescriptive standards became the foundation of a new class of standards called ‘acceptable solutions’, and compliance with an acceptable solution was deemed compliance with the building code. However, the Building Act made it clear that this was only one method of demonstrating compliance with the building code. The other method, in effect based on unique designs, was referred to as ‘alternative solutions’. A further class of standards was created called ‘verification methods’. Verification methods contained the tests that could be applied to determine whether an alternative solution met the performance requirements of the building code. Expert advice, including that provided by the Building Research Association of New Zealand (BRANZ), was also sought at both the consenting and inspection stages, as an input into the judgment that an alternative solution met the requirements of the building code.

A simplified description of the building control regime is provided in Figure 2. This Figure illustrates how community expectations in relation to building performance are reflected in a

hierarchy of controls, from the primary statute through to the performance-based building code, the choice of prescriptive standards or unique designs, and the process of assessing compliance with the building code at both the consent and inspection stages of building design and construction.

Figure 2: Simplified description of New Zealand's post-1991 building control regime

Performance of the Building Act 1991

The initial public indications that there was a problem with the building control regime emerged with media reports on the leaking of Mediterranean-style dwellings constructed using monolithic cladding. This design relies on careful construction to avoid water penetrating the building envelope (walls and roofs), as without modification it lacks a second line of defense,

such as a cavity between the outer and inner walls. Effectively, if the water penetrates the envelope it cannot get out, causing rotting. The design originated in dryer climates. However, New Zealand has a high rainfall and rain that is often wind-driven, thus placing considerable stress on the integrity of building envelopes.

The magnitude of the problem is difficult to gauge because it continues to be a hidden problem. Rot occurs inside walls and it may be some time before it is detected. In 2007 the *New Zealand Herald* reported on the release of official papers which indicated that 30,000 monolithic-clad homes built between 1992 and 2004 are at risk of leaking, affecting 80,000 owners and occupiers. The average cost of settling claims was \$150,000, placing the total cost at \$4.5 billion. A local authority commented in the same article that more detailed work indicted that fewer than 30,000 buildings were affected, and the total cost in the order of \$2.8 billion.⁴¹ At the upper end of the scale, Greg O'Sullivan, from building surveyors and remedial design company Prendos, has recently predicted costs in the order of \$11 billion, with home owners being affected for another 20 years.⁴²

The indirect costs include the stress to homeowners and the health risk, as dampness and rotting can permit fungi to grow, resulting in respiratory problems. Some fungi are also toxic, causing flu-like symptoms which those with weakened immune systems are particularly vulnerable to.⁴³

The Hunn Committee, the Ministry of Economic Development and the Government Administration Select Committee reviews all concurred that the incidence of leaky buildings was a symptom of deeper problems in the building industry and regulatory environment. While different commentators placed different weight on the various factors that were seen to

⁴¹ Bernhard Orsman, "Stressful Wait for 80,000 Leaky Home Victims," *New Zealand Herald*, October 10, 2007.

⁴² Cliff Taylor, "Leak Crisis Could Cost \$11 b," *New Zealand Herald*, July 20, 2008.

⁴³ Department of Building and Housing and Consumer NZ, "Damp and some mould or fungi can have serious health implications for some people living in a leaky home." *ConsumerBuild*.
<http://www.consumerbuild.org.nz/publish/leaky/leaky-health-risks.php>.

have contributed to the building failures, the following list summarises the perceived causes of the failures identified in the three reviews:

1. A very competitive building environment, which created an imperative to cut costs, also led to the cutting of corners;
2. A lack of professional trade skills and judgment;
3. A lack of effective supervision and inspection – buildings were being built using a series of sub-contractors, with no one having responsibility for overall quality control;
4. An emphasis on the product not the building system. In this case the cladding product, not on whether that cladding, in that particular design, in those particular weather conditions, would keep the water out;
5. A lack of sufficient guidance in acceptable solutions and verification methods;
6. Consumers who were not informed enough about the implications of the choices they were making;
7. Failures in the regulatory back-stop, which ranged from inadequate consenting and inspections by territorial authorities, through to inadequate monitoring of outcomes by the BIA.

2004 building reforms

The immediate result of the reviews of the building control regime was a new building act that contains many more checks and balances than the one it replaced, and arguably is much more interventionist.

There are some grounds for this conclusion. There is a new requirement that critical building work (defined by regulation) must be undertaken or supervised by licensed building practitioners (building trades, engineers and architects). As there was no extant occupational licensing in this area (although engineers and architects are registered occupations), the

Building Act 2004 sets one up. There is a new regime for dam safety based on mandatory inspection (for small dams) and independent third-party audited quality assurance systems (for large dams). There is also a new requirement that territorial authorities be accredited as inspection bodies. To be accredited, territorial authorities must document their procedures for assessing applications for building consents and building inspections in line with a standard promulgated by the Department of Building and Housing (DBH). Territorial authorities are then audited by International Accreditation New Zealand (IANZ) against the standard.

These hard-wired statutory requirements are the more obvious changes, but the most significant changes are more subtle and are reflected in a shift in the underlying regulatory philosophy.

Firstly, the statute sets up the DBH as the central coordinating and control authority. In effect, the Chief Executive of the DBH must keep the law and building practice under review, identify risks and opportunities in relation to the purpose of the 2004 Act, and develop and implement strategies to manage these risks and exploit these opportunities. The DBH has a number of tools at its disposal which were not available to the BIA. The 2004 Act requires the Chief Executive to establish a building advisory panel of experts in the building sector to assist him or her in carrying out the monitoring role. The DBH is also able to be more directive than the BIA. It can on its own volition initiate the determination process. Determinations are the outcome of a process whereby the DBH assesses whether an alternative solution meets the requirements of the building code. Under the Building Act 1991 the BIA was only able to act on an application for a determination from a home owner or territorial authority. The DBH can issue warnings and bans, and mandate compliance documents (previously known as acceptable solutions). Finally, The DBH is able to produce guidance documents to inform participants in the building sector, including building practitioners and homeowners.

Secondly, the underlying philosophy of the 2004 Act places more emphasis on the welfare of building owners and occupiers, and in particular the owners or occupiers of dwellings. As a result, the building control regime established by Building Act 2004 has a stronger consumer protection focus than the Act that it replaced. This focus is evident in the purpose of the Act,

which now includes the requirement that: ‘. . . buildings have attributes that contribute appropriately to the health, physical independence, and well-being of the people who use them’.⁴⁴ This requirement establishes a new threshold for the building control regime, and all who participate in it, of individual well-being, a broader concept than either safety or health (and a clearer articulation of ‘amenity’ which, in the Building Act 1991, was a secondary, not primary purpose). The stronger consumer protection focus is also reflected in the broader set of principles that the minister, chief executive and front-line regulators (territorial authorities and regional authorities) must apply in performing their functions or duties, or exercising powers, under the Act, and in particular the principle that draws attention to: ‘. . . the role that household units play in the lives of the people who use them’.⁴⁵

The Act also reduces the scope for innovative building solutions through tightening up the criteria that designers and manufacturers need to meet, and shifting the burden of proof on to them to demonstrate that innovative building designs and systems comply with the performance requirements of the building code. While front-line regulators continue to make decisions on reasonable grounds that a building design or construction meets the performance requirements in the building code, designers and manufacturers are required to meet higher standards of proof than previously. The Act foreshadows this in one of the principles that territorial authorities must have regard to, namely: ‘The importance of standards of building design and construction in achieving compliance with the building code.’⁴⁶

The rationale for this principle is that, in the shift from prescription to performance in the 1991 building control regime, the importance of standards was lost, and needed to be explicitly acknowledged in the new regime. The DBH guidance reflects the principle as follows: ‘Building projects will need to include detailed plans and specifications as part of the application - these also need to demonstrate compliance with the Building Code and, from 30

⁴⁴ Building Act 2004, 3(b).

⁴⁵ Building Act 2004, 4(2)(a)(i).

⁴⁶ Building Act 2004, 4(2)(f).

November 2009, parts of them will need to be certified by a licensed building practitioner with a design licence.’⁴⁷

Given that a primary objective of the 1991 building control regime was to encourage innovation, and the 2004 reforms were a reaction against building failures resulting from the widespread use of innovative cladding systems, what emphasis did the government place on innovation as an objective in the new building control regime? The government’s objective was set out by the Minister responsible for the review of the 1991 regime and the resulting Building Act 2004, Hon Lianne Dalziel. She emphasised the need for balance:

We are keeping the performance-based model provided by the 1991 Act. This model encourages and supports innovation. The pendulum has swung too far one way, and it was our challenge to ensure that it didn’t swing too far the other way. The changes represent a position of balance. However, there are those who overstate the “innovation” verses “prescription” line, implying that they are opposites. They are not. ‘Innovation’ cannot be used as an excuse not to meet minimum standards that are prescribed to ensure health, safety and amenity.⁴⁸

The regime is still relatively new and may not yet have reached a point of equilibrium. The pendulum could still be swinging. However, two effects have been observed and commented on. The first is that the new regime has imposed high compliance costs. The government has responded to this concern and taken a number of initiatives, particularly to reduce the costs to builders of low-cost, standardised dwellings. One of the most experienced territorial authority building officials, George Skimming, has commented on these initiatives as follows: ‘The changes announced this week swing the pendulum back to a position where house buyers are reasonably protected against shoddy building practices and building defects - but without the

⁴⁷ Department of Building and Housing, “Building Consent and Inspection Process.” www.tenancy.govt.nz/blc-building-consentinspect-process.

⁴⁸ Lianne Dalziel, “Design and Build it Right First Time,” *Weathertightness News*, 2 (June 2003).

levels of red tape that have pushed up construction costs and slowed down building in the last couple of years’.⁴⁹

The second effect is on innovation. The documented information on this effect seems to be slight, but in a co-authored paper entitled ‘*Fifteen years of performance-based design in New Zealand*’ (2006) it was concluded that:

The 2004 Act has created an environment where innovative solutions are significantly more difficult to introduce, but not impossible. A higher level of proof in design, as well as much higher standards of drawing and detailing are now required. A key feature is that code compliance must be demonstrated by compliance with the consent documentation rather than directly with the building code as had previously been the case. Well designed and detailed innovative buildings still find acceptance in the market-place.⁵⁰

The Building Act 2004 created a risk-based regulatory regime with a presumption in favour of consumer protection and many more checks and balances. It remains performance-based, and in this respect (as well as containing a principle that innovation should be encouraged)⁵¹ it shares the sorts of goals that are associated with the performance-based regulation generally. It does however impose a cost on innovation commensurate with the risk. The risk assessment and mitigation strategies are matters of regulator discretion and judgment. The Building Act provides guidance but does not prescribe what the judgment should be.

The ‘case’ that is being examined

The case that I am examining in this thesis stems from a category of events which, while relatively small in themselves, have dramatic adverse effects and are commonly believed to have resulted from a systems failure. Because they result from systems failures they could happen time and time again, unless the underlying problem is addressed.

⁴⁹ Greater Wellington Regional Council, “Building Changes Will Swing Pendulum Back,” *Infonews.co.nz*. March 26, 2008. www.infonews.co.nz/news.cfm.

⁵⁰ A. H. Buchanan et al, “Fifteen Years of Performance-Based Design in New Zealand” (paper presented at the 9th World Conference on Timber Engineering, Portland, OR, USA: August 6-8, 2006).

⁵¹ Building Act 2004, s4(2)(g).

The relatively small event is a building that leaks, often because of an omission in workmanship that might be regarded as trivial; a sealant that is imperfectly applied or the distance between the bottom of the cladding and the ground less than the required 10 cm. The dramatic and adverse effect is associated with the consequences for building owners and users. Remediation often costs tens of thousands of dollars per building, and thousands of buildings were affected due to a decade of inaction.

The decade commenced with the adoption of performance-based regulation. Performance-based regulation is a rationally constructed regulatory approach and is ‘purposeful’ – that is, it has been specifically designed to achieve a particular purpose or goal, rather than having evolved on the basis of incremental changes to an existing regulatory approach. It therefore represents a break with the past and a novel innovation in its own right (as well as being designed to facilitate innovation).

The association of a novel regulatory approach with the demonstrable failure of the building control regime to prevent, detect or address ‘leaky buildings’ gives rise to an important ‘what if’ question; what if the failure of the building control regime can be attributed to the inherent character of performance-based regulation? Given the popularity of performance-based regulation, this is something that we need to know. But having this knowledge is not sufficient. Performance-based regulation is a means to a desirable end, namely lower regulatory costs and more innovation. Should inherent weaknesses be uncovered, the analytical task is not complete until we have turned our minds to the ways in which performance-based regulatory regimes could be designed to minimize the risks of failure while at the same time realizing the promise of this regulatory approach.

Chapter 2: Methodology

Research question

Regulation can aim to achieve multiple objectives and the choice of regulatory instrument can be determined by the range of objectives or the weighting put on particular objectives. So it is with performance-based regulation, as this instrument is selected in part because it is seen to facilitate innovation as a spill-over benefit, and innovation can be an objective of the regulatory regime in its own right. This distinction can be demonstrated by the two ways that innovation as a regulatory objective can be framed:

1. The purpose of the law is to protect public health or similar goal, and it will do this through encouraging innovative solutions, such as an innovative building technology that makes buildings safer, or
2. The purpose of the law is to protect public health and encourage innovation which will benefit both society and the economy, such as an innovative building technology that that not only makes buildings safer but also forms the basis of a new export market.

The former assumes that innovation is secondary to, and dependent on, the objective of protecting public health (a qualified licence to innovate). The latter assumes that innovation is inherently welfare enhancing and as such is worth pursuing in its own right (an unqualified licence to innovate).

Given its more ambitious framing, my study assumes a belief in the intrinsic value of technological progress as a product of innovation, and hence the inherent desirability of an unqualified licence to innovate. I do not intend to imply a devaluing of other objectives, such as public health. Indeed, regulation that does not meet community expectations in relation to what is widely held to be the primary objective of the law will be seen to fail irrespective of any broader contribution to overall welfare. For example, it is self-evident that a law which purports to protect public health will be judged by the community to fail if public health is not

protected. An argument that a reduction in public health has been offset by overall gains to technological progress would not be credible, or at least not be politically defensible. My first assumption, therefore, is that the more innovation the better, but subject to this constraint. Innovation in the building area might be described as: ‘Innovative construction methods and new materials, or standard products used in a non-traditional way . . . used to meet architectural requirements or economic needs.’⁵²

My second assumption is that innovation involves risk-taking. It follows logically that my research objective must accommodate the two dimensions of what might be described as the challenge of designing performance-based regulatory regimes, namely the encouragement of innovation and the management of risk. Risk itself needs to be unbundled as it covers the risk that an innovation might fail, and the risk that failure will bring the regulatory regime into disrepute because community expectations have not been met. The only way to reconcile risk-taking within the framework of a regulatory regime that purports to protect people is to assume that the community is tolerant of some failure. Hence we have the elements of the research question, namely:

What conditions and behaviours are necessary to achieve innovation as one of the normative benefits of performance-based regulation while maintaining the risks of innovating within limits that the community is prepared to tolerate?

In answering this question I need to understand the particular characteristics of the building environment that were associated with the failure of monolithic-clad buildings, and the extent to which these characteristics emerged because of the performance-based regulatory regime introduced with the Building Act 1991. This understanding provides the foundation for addressing the research question.

⁵² G. Van Eck et al, “Inherent defect Insurance” (paper presented to the International Association of Engineering Insurers (IMIA) Conference (IMIA WGP14 (01)E), Sydney, Australia, September 2001), 6.

Methodological heuristics

There are a number of writers who, with the benefit of experience and objectivity, adopt a sceptical view of ‘pure’ methodological approaches. There are also biographers who, in the course of recording the life and times of great thinkers, record some of the great methodological debates. In relation to the former the following have helped frame the methodological approach that I have adopted: Starbuck (2006), *The Production of Knowledge* (2006); Tetlock (2005) *Expert Political Judgement: How good is it? How can we know?*; Saul (1997), *The Unconscious Civilization*; Botkin (1990), *Discordant Harmonies: A New Ecology for the 21st Century* and (2003), *Strange Encounters: Adventures with a Renegade Naturalist*. In relation to the latter Caldwell (2004), *Hayek’s Challenge*, and Skidelsky (1983), *John Maynard Keynes: Hopes Betrayed 1883-1920*, were most influential.

From these sources can be found the idea that methodology should not box one in, but rather be permissive of new and relevant ideas that contribute usefully to the sum of human knowledge. It is a means not an end, and can therefore be described as pragmatic, defined as producing something that is ‘practical’ or ‘useful’ rather than purely theoretical.

There is also scope to select from across the methodological spectrum. The evolution of methodology has not resulted in the survival of the fittest and the most recent is not necessarily the best. The current stock of methodologies reflect ideas that have been lost and then found again, there are converging and overlapping ideas between competing methodologies, and there are old ideas wrapped up in new language. Starbuck attributes the process of rediscovery of old knowledge to the fact that: ‘. . . old knowledge deteriorates unless someone restates it in terms of contemporary concepts and issues.’⁵³

However, a pragmatic approach does not equate to methodological anarchy, and it is possible to extract some rules of thumb from the aforementioned sources that combine pragmatism with analytic rigor.

⁵³ William H. Starbuck, *The Production of Knowledge* (Oxford: Oxford University Press, 2006), 78.

Rule 1: *Take a multidisciplinary approach.* This reduces the glare of a single discipline that blinds one to insights others have reached by looking at a comparable issue through a different lens. I have drawn heavily on the general and specialist regulatory literature, with the former itself often taking a multidisciplinary approach.⁵⁴ I have also taken ideas from the ‘grand theorists’ such as Hayek, Berlin and Keynes, and found insights and analogies in economics, psychology, law and philosophy.

Rule 2: *Theories are useful heuristics rather than binding rules.* Starbuck reflects a view held by others that: ‘General theoretical propositions are heuristic guidelines rather than formulae with obvious applications in specific instances, and it is up to scientists to apply these heuristics in specific instances.’⁵⁵ Caldwell, reflecting Joseph Schumpeter, notes that: ‘. . . theories are not true or false statements about the world but rather conventions or instruments, useful fictions that help us organize data and express the relations that exist among them. The value of a theory depends on how well it accomplishes these tasks.’⁵⁶

Rule 3: *Ground analysis in facts but don’t be a slave to empiricism - there is scope for creativity.* This rule is based on an assumption that empirical information is the building block for any study that seeks to attribute, in full or in part, outcomes to human behaviour, or to quote Herbert A. Simon (who was writing about politics but reached a conclusion that is generally applicable):

My main conclusion is that the key premises in any theory that purports to explain the real phenomena of politics are the empirical assumptions about goals and, even more important, about the ways in which people characterize the choice situations that face

⁵⁴ For a statement on the multidisciplinary character of this literature see the introduction to the journal *Regulation & Governance*, for a statement on the interdisciplinary nature of general research into regulation and governance. <http://www.wiley.com/bw/journal.asp?ref=1748-5983> (accessed May 21, 2009).

⁵⁵ William H. Starbuck, *The Production of Knowledge* (Oxford: Oxford University Press, 2006), 127.

⁵⁶ Bruce Caldwell, *Hayek's Challenge: an Intellectual Biography of F. A. Hayek* (Chicago: University of Chicago Press, 2004), 109.

them. These goals and characterizations do not rest on immutable first principles, but are functions of time and place that can only be ascertained by empirical inquiry.⁵⁷

However, there are problems with strict empiricism. The first is to identify the real meaning that can be attributed to certain facts. Starbuck points to both methodological and cognitive problems of interpretation. The first arises when trying to compute data with a view to making predictions: ‘Because trends change infrequently and idiosyncratic events are frequent, it has turned out in practice that predictions of trend changes have nearly always been wrong.’⁵⁸ The second arises when faced with complex cause and effect relationships. Starbuck makes this point with a quote from Faust: ‘Scientists may have sufficient cognitive ability to comprehend simple configural relationships among cues or variables, but insufficient ability to comprehend more complex relationships.’⁵⁹

The solution is to ground analysis in facts but exercise intuition and creativity in interpretation:

[The scientist] is presented with a mass of facts, possessing similarities and differences, arranged in no kind of scheme or order. His first need is to perceive very clearly the precise nature of the different details....He [then] holds the details together clearly before his mind and it will probably be necessary that he should keep them more or less before his mind for a considerable time. Finally he will with a kind of sudden insight see through the obscurity of the argument or of the apparently unrelated data, and the details will quickly fall into a scheme or arrangement, between each part of which there is a real connection.⁶⁰

⁵⁷ Herbert A. Simon, “Human Nature in Politics: The Dialogue of Psychology with Political Science,” *American Political Science Review* 79: 2 (1985): 301.

⁵⁸ William H. Starbuck, *The Production of Knowledge* (Oxford: Oxford University Press, 2006), 52.

⁵⁹ *Ibid.*, 89.

⁶⁰ Keynes, quoted in Skidelsky, Robert, *John Maynard Keynes: Hopes Betrayed 1883-1920* (London: MacMillan, 1983), 159.

Rule 4: *Own your own facts – someone else's facts may be an opinion or lack foundation.*

Bodkin tells a number of stories of scientific myths, including the: ‘. . . search for the amazing triple canopy rain forest’.⁶¹ Notwithstanding scientific literature and advice from experts all affirming the existence of triple canopy rain forests Bodkin was not able to find any actual evidence of such a forest. The point of the stories is that what purports to be factual but is a secondary source may be subject to a number of errors. Therefore source facts from primary sources, or verify facts from secondary sources if they are important to the argument that is being made. This rule could be put more generally as ‘an injunction to be sceptical’.⁶²

Rule 5: *Don't overcomplicate.* Starbuck notes that: ‘. . . simpler theories are more robust than more complex theories, and simpler methodologies produce more robust findings than more complex methodologies do.’⁶³ It is possible for the mind to intuitively recognise patterns in complex data sets through allowing ‘back office’ mental activity to occur. Some explicit ordering of data is required, but this should not become an end in itself, or crowd out or substitute for what must be left to the mind to resolve.

Rule 6: *How ideas are communicated is important.* Starbuck provides advice on what readers are looking for:

Nearly all empirical studies have very brief lives and insignificant influence, partly because they appear in and add to a cloud of very heterogeneous, mostly meaningless ‘findings’. Readers value works that impose a degree of order on a disorderly mélange, works that seem to sift the more important from the less important.⁶⁴

⁶¹ Bodkin, Daniel B, *Strange Encounters: Adventures with a Renegade Naturalist* (New York: Jeremy P. Tarcher/Penguin, 2003), 91.

⁶² Personal communication from Professor Gary Hawke.

⁶³ William H. Starbuck, *The Production of Knowledge* (Oxford: Oxford University Press, 2006), 119.

⁶⁴ *Ibid.*, 96.

Making a broader point but relevant to the need for research to be accessible and utilised, Saul appeals to a higher goal: ‘I’ve said before that one of the signs of a healthy civilization is the existence of a relatively clear language in which everyone can participate in their own way.’⁶⁵ For these reasons my research is for the most part presented as simple ideas in simple English.

These rules of thumb are applied generally to the two parts of my research, each of which is based on a specific approach.

Explaining failure

The objective of the first part of my research is to see if there is a plausible case that performance-based regulation has some unique vulnerability that makes it susceptible to failure. There could be a direct relationship between this regulatory approach and failure. Alternatively performance-based regulation could heighten the risk of some other factor causing failure.

Failure in this context is ‘government’ or ‘regulatory’ failure, the symptom of which is a public outcry in response to a significant event that materially diminishes the well-being of members of society that the law is intended to protect. There is typically a strong political response to regulatory failure, including the enactment of more intrusive law. While significant enough to create such a reaction, the direct welfare-reducing effects of regulatory failure are mostly on the margin; if safety is the objective then most of society will continue to be safe, but some members will be harmed. Equally, laws designed to keep people safe will not in reality keep all people safe all of the time, but they will not be seen to ‘fail’. Hence, my measure of what is a regulatory failure is essentially political, in the sense that the pressure on politicians to review and reform regulation in response to public outrage becomes overwhelming.

⁶⁵ John Ralston Saul, *The Unconscious Civilization* (Australia: Penguin Books, 1997), 57.

The empirical data for this part is drawn from the so-called ‘leaky building crisis’ in New Zealand. As such it is a single case study. While there are acknowledged risks with single case studies, Yin states that they can be justified on three grounds: a ‘*critical case* in testing a well-formulated theory’; an *extreme or unique case* – its rarity value makes it worth studying; a *revelatory case*: ‘. . . when an investigator has an opportunity to observe and analyze a phenomenon previously inaccessible to scientific investigation’.⁶⁶ The leaky building crisis is an extreme case. It is also unique in-so-far as it occurred in a performance-based regulatory setting that has been described by May as: ‘. . . the only case of a fully implemented performance-based regime that spans a whole sector of regulation.’⁶⁷ In addition, there has been very limited empirical research into the performance of performance-based regulatory systems. The one study that has been undertaken of the leaky building crisis was undertaken by May.⁶⁸ This has been described by Bluff & Gunningham as: ‘. . . a rare empirical study of a performance standard’.⁶⁹

Starbuck also argues the relevance of studying unique cases:

To appreciate the full ranges of potential behaviors, one needs to see how social systems operate in unusual circumstances These natural experiments occur when exogenous events displace social systems from their normal equilibria. As a result, one can see some of the systems’ adaptive and reactive capabilities, which opens the possibility of discovering why equilibria exist.⁷⁰

⁶⁶ Robert K. Yin, *Case Study Research: Design and Methods* (2nd ed.) (Thousand Oaks: Sage Publications, 1994), 38-40.

⁶⁷ Peter J. May, “Regulatory Regimes and Accountability,” *Regulation & Governance* 1: 1 (2007): 14.

⁶⁸ Peter J. May, “Performance-Based Regulation and Regulatory Regimes: The Saga of Leaky Buildings,” *Law and Policy* 25: 4 (2003).

⁶⁹ Elizabeth Bluff and Neil Gunningham, *Principle, Process, Performance or What? New Approaches to OHS Standards Setting* (Working Paper 9. National Research Centre for OHS Regulation, July 2003), 25.

⁷⁰ William H. Starbuck, *The Production of Knowledge* (Oxford: Oxford University Press, 2006), 152.

This part is grounded in qualitative data, with the term having a specific meaning as it is taken from ‘grounded theory’. This methodological approach makes no theoretical assumptions and is not based on testing pre-determined hypotheses. As such it can be contrasted with the prevailing hypothetico-deductive approach which tests predictions that take the form of hypotheses. The strength of the latter approach is that it tests and elaborates existing theories, ‘. . . but neglects the equally important phase of discovery.’⁷¹

Grounded theory was conceived by Glaser and Strauss. It is based on the idea that theory can be inductively derived from qualitative data, and describes a process for analysing such data. From grounded theory can be taken the underlying idea that new insights are more likely to emerge with a methodology that is not constrained by *ex ante* theoretical assumptions, and an analytical process that follows a particular pattern. As grounded theory has evolved, variations have been introduced that mean there is no one prescribed process, but there are typically four elements in common: an initial scan of relevant literature, data gathering, data ordering and data analysis.

Literature review

While research based on grounded theory makes no theoretical assumptions, there is general acceptance that the minds of researchers are not a ‘blank sheet’. There is also a normative argument that researchers should not attempt to free their mind of extant theory.⁷² In discussing grounded theory, Pidgeon & Henwood suggest that: ‘The researcher needs at least *some* theoretic resources to begin the process of interpretation and representation’.⁷³ Also relevant to this point is an observation made by Max Weber: ‘We cannot discover, however,

⁷¹ Nick Pidgeon and Karen Henwood, “Using Grounded Theory in Psychological Research,” in *Doing Qualitative Analysis in Psychology*, ed. Nicky Hayes (Hove, East Sussex: Psychology Press, 1997), 252.

⁷² Glaser disputes this, stating that the dictum with grounded theory is ‘not to review any of the literature in the substantive area under study’ as this will both contaminate and constrain the researcher (Glaser, B.G. (1992). *Basics of Grounded Theory Analysis*. Sociology Press, Mill Valley, CA:31).

⁷³ Nick Pidgeon and Karen Henwood, “Using Grounded Theory in Psychological Research,” in *Doing Qualitative Analysis in Psychology*, ed. Nicky Hayes (Hove, East Sussex: Psychology Press, 1997), 255.

what is meaningful to us by means of a “presuppositionless” investigation of empirical data. Rather perception of its meaningfulness to us is the presupposition of its becoming an *object* of investigation.’⁷⁴

Therefore, I have based my data gathering and analysis on an informed view of the possible sources of regulatory failure and where the vulnerabilities of performance-based regulation might lie. This informed view comes from a wide reading of the literature. Particular emphasis has been placed on the insights provided by the general regulatory literature, and the specific literature on how performance-based regulation works in practice and the issues that arise. While noting that from a sequencing perspective, this literature review occurred first in the analytical process, as I progressed through the empirical enquiry I augmented the literature. In particular, I included studies on regime change. Chapter 3 provides my synthesis of established guides to regulatory failure.

Data gathering

Following the idea that data should be drawn from a range of different sources,⁷⁵ my empirical data came from three sources:

- Determinations provided by the BIA/DBH. Determinations are expert assessments of individual dwellings to assess whether they comply with the performance requirements of the building code. They measure the quality of workmanship against a prescribed set of benchmarks.
- Adjudications relating to dwellings undertaken by the Weathertight Homes Resolution Service (WHRS) and also court cases in the same area. These are in-depth investigations that not only assess the quality of workmanship but also assign both responsibility and liability.

⁷⁴ Max Weber, quoted in Bruce Caldwell, *Hayek's Challenge: an Intellectual Biography of F. A. Hayek* (Chicago: University of Chicago Press, 2004), 89.

⁷⁵ Robert K. Yin, *Case Study Research: Design and Methods* (2nd ed.) (Thousand Oaks: Sage Publications, 1994), 90.

- Two independent reviews undertaken pursuant to the identification of widespread leaking in dwellings. These reviews identify a broader range of factors contributing to the leaky building crisis than the previous two iterations.

Data ordering

The purpose of ordering the data is to facilitate the analysis. Grounded theorists focus on processes, which can be thought of as ‘conditions, interactions and consequences’ occurring over time.⁷⁶ Conditions are created at different levels: ‘. . . from the most general international conditions right down to the group, interactional, and action levels.’⁷⁷ In reflecting these general concepts in the specific approach to data ordering I have adopted, I have draw on the ideas of Reason, and Moran, Ostrom & Randolph.

Reason’s work is interesting because it addresses situations of failure, as does my thesis. Reason postulates that failures in complex situations can generally be attributed to a number of events acting in unison, and more importantly it requires this combination of events for the failure to occur:

.

In considering the human contribution to systems disasters, it is important to distinguish two kinds of error: active *errors*, whose effects are felt almost immediately, and *latent errors* whose adverse consequences may lie dormant within the system for a long time, only becoming evident when they combine with other factors to breach the system’s defences . . . [it is] increasingly apparent that latent errors pose the greatest threat to the safety of a complex system.⁷⁸

⁷⁶ Dey, I. Grounding Grounded Theory: Guidelines of qualitative inquiry. Academic Press: 149.

⁷⁷ *Ibid.*: 152.

⁷⁸ James Reason, *Human Error* (Cambridge. Cambridge University Press. 1990), 173.

Moran, Ostrom & Randolph provide a useful technique for ordering data that reflects combinations of events.⁷⁹ They have developed the concept of ‘tiers of decision-making’, with decisions made at one tier affecting other decisions in the same tier, or decisions at another tier, with the effects felt across time (a decision at tier one may not have an effect at other tiers until sometime in the future). An example of a tiered approach is provided in Figure 3.

⁷⁹ Emilio Moran, Elinor Ostrom, and J. C. Randolph, “A Multilevel Approach to Studying Global Environmental Change in Forest Ecosystems” (paper presented at the Earth’s Changing Land, GCTE-LUCC Open Science Conference on Global Change, Barcelona, Spain, March 14–18, 1998).

Figure 3: Tiers of decision-making (with indicative behaviours)

Data analysis

My method for data analysis draws on Yin (1994), *Case study research: design and method*. One of the alternative approaches to analysing case studies outlined by Yin is described as ‘explanation-building’, and takes the following form:⁸⁰

- ‘Making an initial theoretical statement or an initial proposition about policy or social behavior
- Comparing the findings of *an initial case* against such a statement or proposition
- Revising the statement or proposition
- Comparing other details of the case against the revision
- Again revising the statement or proposition
- Comparing the revision to the facts of *a second, third, or more cases*
- Repeating this process as many times as is needed.’ Martin & Turner note that by the time three or four sets of data have been analysed, the majority of useful concepts will have been discovered.⁸¹

I have applied the iterative process described by Yin to identify important and recurring ‘phenomena’. According to Haig: ‘Phenomena are relatively stable, recurrent general features of the world that we seek to explain’.⁸² I am particularly looking for features of the regulatory environment that permitted widespread and damaging leaking of buildings over an extended period of time, notwithstanding the fact that the building code established a

⁸⁰ Robert K. Yin, *Case Study Research: Design and Methods* (2nd ed.) (Thousand Oaks: Sage Publications, 1994), 111.

⁸¹ P. Y. Martin and B. A. Turner, “Grounded Theory and Organizational Research,” *The Journal of Applied Behavioral Science*, 22: 2 (1986): 149.

⁸² Brian D. Haig, “Grounded Theory as Scientific Method,” in *Philosophy of Education Society Yearbook* (Urbana: University of Illinois Press, 1995).

mandatory standard that was supposed to prevent this happening. My analysis is presented in chapter 4, entitled ‘What factors contributed to dwellings failing to perform as expected?’

However, because this analysis does not by itself explain the relationship between such phenomena and performance-based regulation, I have taken my analysis to another stage. Firstly, I have compared New Zealand’s performance-based regime as it was designed and delivered with its original conception. Secondly, I have compared the performance-based regime with a stylised standards-based regime. A standards-based regime is one where regulatory requirements are largely prescriptive, and results from a generally conservative standards-setting process where technology shifts happen on the margin, based on a consensus of the regulator, technical experts and the community. A standards-based regime was in place in New Zealand for a number of decades, until it was replaced by the performance-based regime introduced by the Building Act 1991. My comparative analysis is presented in chapter 5.

My objective is to build a picture which, in the first instance, locates the source of the phenomena in a regulatory regime that was poorly conceived, designed, implemented and/or administered. Comparing the regime as it was designed and delivered with the original concept will help answers the questions: if the concept had been reflected accurately in the design of the regime (the statute and institutions), or if it had been implemented and administered in a manner consistent with the design, would the phenomena have emerged? The comparison with a standards-based regime should help establish whether, at one or more of the stages of concept, design, implementation and administration, the performance-based character of the regime was a contributing factor. Specifically, is there something inherent in standards-based regulatory regimes that make them relatively ‘safe’ which was not present in the performance-based building regulatory regime, and can this account for the phenomena that have been observed? If so, is this something which is specific to the New Zealand ‘case’ or a general weakness in performance-based regulatory regimes?

As ideas emerge through the comparative analysis, relevant literatures have been reviewed to provide explanatory coherence. Grounded theory supports this approach: ‘Overall, tying the

emergent theory to existing literature enhances the internal validity, generalisability, and theoretical building from case study research . . . because the findings often rest on a very limited number of cases.’⁸³

Finally, my unit of analysis is the performance-based regulatory *regime*, rather than performance-based regulation *per se*. Performance-based regulation describes the manner in which mandatory standards are couched, whereas the regulatory regime includes the institutions and legal framework which establishes overall goals and principles, and determines the roles, obligations and rights of those who are expected to comply with mandatory standards, and of those who set the standards, and monitor and enforce compliance. The selection of the regime as the unit of analysis is consistent with Hood *et al*:

. . . any serious attempt to evaluate regulation has to include an assessment of how regulation works at the level of *regimes*, and that . . . often involves putting together hard-won knowledge that is scattered among multiple organizations and levels of government. Regulatory assessment that focuses exclusively on standards but not on the effect of enforcement or behaviour-modification activity may be easier to do against tight deadlines but will fail to capture how the regime works.⁸⁴

The empirically-based explanation-building stage provides insights into: (i) the weaknesses that emerged in New Zealand’s performance-based regulatory regime in the building sector (ii) the extent to which these weaknesses can be attributed to the intrinsic nature of performance-based regulation generally, rather than for reasons that, while associated with performance-based regulation, are specific to New Zealand or the building sector, or for reasons that are not associated with performance-based regulation, and (iii) the points in a performance-based regulatory regime that could be strengthened to bring the risks within tolerable limits while still facilitating innovation.

⁸³ Eisenhart, 1989, cited in Naresh R. Pandit, “The Creation of Theory: A Recent Application of the Grounded Theory Method,” *The Qualitative Report* 2: 4 (1996).

⁸⁴ Christopher Hood, Henry Rothstein, and Robert Baldwin, *The Government of Risk: Understanding Risk Regulation Regimes* (Oxford: Oxford University Press, 2001), 180.

Strengthening the regime

It is in the way of things that with analysis that extends from problem definition to solution it is necessary to presage, in the section on methodology, how the solutions-analysis will be dealt with, even though it is dependent on, and does not commence, until the problem definition is complete and conclusions drawn. So it is in this case. I am foreshadowing that in fact the empirical and comparative analysis did reveal particular vulnerabilities in performance-based regulatory regimes generally. I am also foreshadowing that I have identified two strategies for strengthening performance-based regulatory regimes such that they facilitate innovation and operate within risk tolerances acceptable to the community. Effectively, having completed my empirical and explanation-building stages I have started again by way of taking two ideas, and further developed and tested them by reference to relevant literatures.

The two ideas that emerged from the explanation building phase that had most salience are the need to ensure that appropriate expertise is applied to decisions on novel technologies that have a significant social content (there could be benefits to the community, but also risks and negative consequences) and the need to treat novel technologies as experiments. Both derive from the recognition that performance-based regulation creates uncertainty in terms of what does or does not comply with the performance goals. The use of experts may reduce uncertainty through improving the quality of decision-making, but inevitably innovation involves risk-taking. Treating such innovations as experiments could permit the risks and consequences to be better managed.

Experts

Chapter 6 on experts and wisdom explores in more detail the sources of uncertainty, drawing on the literature on standards and regulation and putting this into a dynamic socio-economic context, positing that technical regulation is being asked to meet an increasingly complex set of expectations which increases uncertainty. I discuss how performance-based regulatory regimes might evolve given the conflicting objectives of flexibility (to facilitate innovation)

and certainty (to minimise risk), and whether relying on a natural evolution will result in an optimum balance between risk-taking and risk-avoidance.

I then proceed to examine the nature of experts and expert judgment, and the extent to which placing more emphasis in the regulatory regime on the role of expertise will make it more likely that the optimum balance between risk-taking and risk-avoidance will be struck. In doing so, I draw on literature relating to both expertise and wisdom.

Experiments

In chapter 7 I put the case for explicit experimentation. Drawing on my empirical analysis of the leaky-building crisis, I start with the proposition that novel ways of doing things are inherently experiments; they can however be ‘passive’ insofar as they are not formally set up as experiments, or they can be formal or ‘explicit’ experiments. I associate regulatory failure with technologies that fail because of their experimental nature and in situations where the consequences of failure are very high. The failure of the experiment is, however, a symptom. Regulatory failure occurs because the law was not seen by the community as adequate to either manage the risk of failure or mitigate the consequences.

In addition to exploring the case for experimentation, I examine four alternative approaches: market-based with an insurance backup; informal experts-driven; informal regulator-driven; and explicit experimentation. I then turn to the factors that need to be addressed in establishing a regulatory regime based on explicit experimentation. I draw on the experience in the United States, where programmes for explicit experimentation were established in the environmental area. This experience identified a number of critical factors associated with the success and failure of such programmes.

Chapter 3: Drivers for performance-based regulation and its limitations

Background

What can lead to the failure of regulatory regimes? If we understand this, and have a good empirical understanding of the particular features of performance-based regulation, we are in a position to make some assumptions about the possible sources of failure in regimes based on the idea that the law should prescribe outcomes, rather than require compliance with prescriptive standards. In this chapter I review relevant literatures. I identify that regulatory failure could result from one or a combination of poor design, poor implementation, or constraints on the capacity of the state to determine regulatory outcomes. I then go on to identify the unique characteristics of performance-based regulation that might make it vulnerable to failure. These signposts inform my empirical enquiry and show the gap in the literature to which the conclusion of my thesis will contribute.

Characteristics of the regulatory state

Regulation is one of three mega-constructs that order economic and social affairs in the public sphere, the other two being the market and provision by the state. Regulation is however pervasive, insofar as it is necessary to support the market through reducing transaction costs, for example in relation to the enforcement of contracts, and to enable the state to collect revenue and direct it to those areas where it intends to spend. Even so, regulation and the market are often presented as alternatives, to the extent that regulation is often presented as inferior to the market and should only be contemplated to address market failures.⁸⁵ Regulation and state provision are also sometimes represented as alternatives, such that

⁸⁵ Julia Black, *Critical Reflections on Regulation* (London: The London School of Economics and Political Science, 2002), 7.

reducing one may increase demand for the other.⁸⁶ Regulation has a number of important characteristics.⁸⁷

It is the exercise of coercive powers by the state: Regulation requires members of society to do things, or to refrain from doing things, either directly or indirectly. It penalises, sometimes to the point of taking away someone's liberty, if they fail to comply. Thus it is the exercise of coercive powers by the state. The right to regulate therefore carries with it an obligation to regulate in the best interests of the community, and regulation must be exercised in a manner which is fair, and seen to be fair.

It often involves making tradeoffs: Establishing what is in the best interests of the community can require a calculation of the overall costs and benefits. Regulation is not costless. In the economic domain these include the compliance costs on firms, the administrative costs on governments, and the dampening effects on overall national productivity. While impossible to estimate precisely, one US study suggested that the direct costs (compliance and administrative costs) alone, could be in the order of 8-10 percent of GDP.⁸⁸ A formal cost-benefit calculation, which is for example required in those countries that have regulatory impact analysis regimes, requires the tradeoffs between those who benefit from regulation and those who have to pay the costs, to be made explicit. In some areas the community is reasonably clear that certain actions are egregious and should be constrained, or desirable and should be promoted, but in other situations the costs and benefits are less clear or evenly balanced. Waldron has suggested in that in these situations the choice framework needs to acknowledge that there is more than one right answer, and identifies parliament, as

⁸⁶ C. R. Wise, "Regulatory Takings," in *Handbook of Regulation and Administrative Law*, ed. David H. Rosenbloom and Richard D. Schwartz (New York: M. Decker, 1994), 171.

⁸⁷ These characteristics were distilled from a range of sources, including: Legislation Advisory Committee. *Guidelines on Process and Content of Legislation*. 2001 edition and amendments; Matthew S. R. Palmer, "New Zealand Constitutional Culture," *New Zealand Universities Law Review* 22 (2007); Anthony I. Ogus, *Regulation: Legal Form and Economic Theory* (Oxford: Clarendon Press, 1994).

⁸⁸ Thomas Hopkins, *Profiles of Regulatory Costs. Report to the U.S. Small Business Administration* (U.S. Department of Commerce, National Technical Information Service #PB96 128038, November 1995). Table A-5, 39.

the assembly of elected representatives of the community, as the place where such choices can be made.⁸⁹ That being said, regulation can lead to a stability of expectations which is itself beneficial. For example, it can provide certainty to consumers and traders as to the application of the law in situations of dispute, which permit them to transact with confidence.

It is often a political act: The source of much of New Zealand law is parliament with the main players being elected officials – participating in parliament as a whole, the Executive, or as individual ministers with decision-making authority. Regulation-making in these situations is essentially a political act; politicians are the ultimate decision-makers, albeit constrained by laws, conventions, and public opinion. The political character of decision-making has given rise to public choice theory; the insight that where the costs or benefits of regulation are most concentrated the affected parties will mobilise themselves to effectively lobby politicians for their preferred outcome, and that politicians are responsive where this promises votes and hence the prospect of retaining power. Notwithstanding the obligation to regulate in the best interests of the community, there is a real possibility that regulation could further the interests of the most organized lobbyists.

It is often devolved: While statutes are enacted by parliament, subsidiary regulation and the administration of law is devolved to a wide range of institutions, including the Cabinet, ministers, government departments, independent statutory bodies and self-regulatory or co-regulatory bodies. There can be a cascading effect. For example the minister is the decision-maker but reliant on advice from a government department or specialist body. Often the institutions that are directly involved in the formulation of laws or in their delivery have an information advantage over the ‘principal’, be it parliament, the Executive or ministers. Principal-agent theory provides the insight that agents such as regulators will use their information advantage to pursue their own agendas, rather than those envisaged by the law-makers.

⁸⁹ Jeremy Waldron, *The Dignity of Legislation* (Cambridge: Cambridge University Press, 2007).

The regulatory state is also a multi-faceted system. In a Westminster system of government the key elements of the system are: constitutional law or conventions, which can be loosely described as durable rules for the conduct of governments in relation to citizens; statute law, which is enacted by parliament; common law which is administered by the Courts; secondary and tertiary regulation; self-regulation or co-regulation; and a variety of supporting institutions, including regulators, watchdogs and advisors on the law. The relationships between the various elements of the system are complex, leading to the observation by Palmer & Palmer that: ‘Government can be highly intricate and convoluted, depending on the issue to be determined and the political contention the issue generates.’⁹⁰

The regulatory state is also evolving in response to a range of socio-political pressures. Some of the key trends are as follows.⁹¹

Internationalization of domestic law: While globalization is an imprecise term, it does capture the dynamic of global market liberalization creating demand to both reduce the regulatory costs of transacting across borders, and the need for more effective enforcement across borders. The practical implication of this is there is a convergence of laws between countries. Sometimes this convergence is based on norms or rules that are developed in international organizations. In other cases it reflects bilateral or plurilateral convergence. Convergence occurs at the level of statute and subsidiary rules, but also through the Courts interpreting domestic laws within the framework of international Treaties.

⁹⁰ Geoffrey Palmer and Matthew Palmer, *Bridled Power: New Zealand Government under MMP* (3rd ed.) (Auckland: Oxford University Press, 1997). 20.

⁹¹ These trends were distilled from a range of sources, including: Michael McConkey, *Thinking Regulation: A Roadmap to the Recent Periodical Literature* (Prepared for the Privy Council Office of the Government of Canada, September 2003); Mary Douglas and Aaron Wildavski, *Risk and Culture – An Essay on the Selection of Technological and Environmental Dangers* (Berkeley: University of California Press, 1982); Sol Picciotto, “Regulatory Networks and Global Governance,” in W. G. Hart Legal Workshop, 27-29 June 2006, London, (Unpublished); Regulation Taskforce, *Rethinking Regulation: Report of the Taskforce on Reducing Regulatory Burdens on Business* (Delivered to the Australian Government on 31 January 2006); Stephen G. Breyer and Veerle Heyvaert, “Institutions for Regulating Risk,” in *Environmental Law, the Economy, and Sustainable Development*, ed. Richard L. Revesz, Philippe Sands, and Richard B. Stewart (Cambridge: Cambridge University Press, 2000) - (particularly the section on ‘The tension between centralizing and decentralizing tendencies in the European Union.’); OECD, *The OECD Report on Regulatory Reform Synthesis* (OECD, Paris, 1997).

Domestic regulatory sovereignty: In parallel with the internationalization of domestic law is demand for autonomy by states over their domestic laws. There are a number of factors influencing this, not least a normative concern that domestic sovereignty is being eroded. Falk reflects those who take a strong position on this:

The state remains the preeminent political actor on the global stage; but the aggregation of states – what has been called ‘a states system’ – is no longer consistently in control of the global policy process. Territorial sovereignty is being diminished on a spectrum of issues in such a serious manner as to subvert the capacity of states to govern the internal life of society, and non-state actors hold an increasing proportion of power and influence in the shaping of world order.⁹²

Practical issues relate to appropriateness and workable of rules developed internationally or in other jurisdictions, in a domestic context which is subject to unique local conditions and preferences.

Demand for a safer world: Communities are demanding higher levels of safety in relation to the food they eat, the environment within which they live and work, and the financial investments they make. Douglas and Wildavsky attribute this to the fact that: ‘. . . the more people have, the more they can lose.’⁹³ This has led to pressure from the community as a whole, and particular interest groups, for stronger laws covering activities that are already regulated, and more laws in areas which have not traditionally been regulated. While there is a well-organized and vocal constituency for such laws, there is also a counter-reaction. The business community in particular lobbies against what it regards as excessive compliance costs, but advocates of individual liberty also express concern over the encroachment of the state on individual freedoms. There is some evidence that governments are reaching the point where they are prepared to say ‘enough is enough’ and at least attempt to push back on the demand for more law as they recognize that there are limits to what the regulatory state can

⁹² R. Falk, *Predatory Globalization: A Critique* (Oxford & Malden MA: Blackwell Publishers, 1999), 35.

⁹³ Mary Douglas and Aaron Wildavski, *Risk and Culture – An Essay on the Selection of Technological and Environmental Dangers* (Berkeley: University of California Press, 1982), 11.

deliver and that life cannot be made risk-free. However, the call by many governments for stronger financial market regulation as a response to the current financial crisis indicates that ‘more law’ continues to be a strategy of choice.

Demand for more flexible and lower cost regulatory regimes: The reaction against more law is becoming increasingly sophisticated. Rather than a call for deregulation *per se*, it has been translated into demand for laws to be more risk-based (involving a calculation of the risks of an adverse event occurring and the consequences, as one dimension of an overall cost-benefit calculation); more flexible, to take into account local conditions, including at the level of the firm or sector; and more certain, so that those who are regulated know what they have to do to comply with the law and if they do certain things they can be confident that they are complying with the law. One manifestation of the demand for more adaptable law is an emerging preference for self-regulation and co-regulation, on the basis that rules developed ‘by the sector for the sector’ are more likely to be appropriate for the sector.

Given these features, complexity and trends, it is evident that there could be many sources of regulatory failure. Figure 4 provides a stylized model of a regulatory system, identifying the various dimensions that need to be thought about in any analysis of regulatory failure.

Figure 4: Sources of regulatory failure

Sources of regulatory failure

The following is descriptive note on the sources of regulatory failure that have been identified in the literature. The first part takes a helicopter view and categorizes failures into their main types. The second part identifies sources of failure that have been specifically associated with command and control regulatory regimes (of which performance-based regulation is one form), and through that lens identify failures that are reputed to arise because of the performance character of the regulatory regime.

Categorization of failures into main types

I have identified three types of failure. There are overlaps between the three but there are key points of difference.

Design failure - the law would have worked if it had been designed better.

Implementation failure - the law would have worked if it had been administered better.

State-centric failure - the law failed because state-centric regulation cannot succeed and/or is dependent on embedded cultural norms, modes of behaviour and capabilities which are alien to the environment in which the law is expected to work.

Design failures arise in situations where: (i) the law does not meet expectations because the wrong policy instrument has been chosen (ii) the cost of complying with the law is excessive and/or, and (iii) the law is seen to be unfair. Sunstein argues the first point, identifying that there will be failure in the original statute if there is reliance on prescriptive regulation when a more flexible approach is warranted, or price control is chosen rather than relying on competition.⁹⁴ At a more detailed design level the law must be able to be effectively enforced and this can be contingent on the powers given to the regulator. For example, Ayres and Braithwaite's widely regarded 'enforcement pyramid' is based on the idea that regulators must be able to escalate the intensity of their enforcement from information to coercion depending on how the regulated entity responds to the lower order interventions.⁹⁵ If the law does not provide the means for this escalation then the regulator does not have the necessary tools at their disposal.

The second point reflects research that has shown that the cost of compliance can have a deterrent effect on the willingness of the regulated sector to comply or even the affordability of compliance.⁹⁶ The third point is also made by Braithwaite, who cites what he describes as 'procedural injustice'.⁹⁷ Procedural injustice embodies the notion that if the regulated sector

⁹⁴ Cass R. Sunstein, *After the Rights Revolution* (Cambridge Massachusetts: Harvard University Press, 1990), 84-87.

⁹⁵ Ian Ayres and John Braithwaite, *Responsive Regulation: Transcending the Deregulation Debate* (Oxford: Oxford University Press, 1992), 35.

⁹⁶ John Braithwaite, *Improving Regulatory Compliance: Strategies and Practical Applications in OECD Countries* (PUMA Occasional Papers in Public Management, OECD, Paris, 1993), 10.

⁹⁷ *Ibid.*: 9-10.

feels that law is unjust (which could of course arise from its administration as well as its design) then compliance will be discouraged.

A subset of design failures arises in situations where the state has multiple objectives and expects the law to deliver on them, but there are inherent tradeoffs. In part this could be attributed to a failure of cost-benefit analysis, either because it is not done adequately or at all. It could also reflect inherent difficulty in determining the ‘national interest’ given the broad range of competing interests. Lodge links these two ideas together, referring to: ‘. . . contradictory objectives which also impede any attempt at evaluation.’⁹⁸ In those circumstances where the law provides for more than one outcome and there are measurement difficulties that prevent tradeoffs being made explicit, the law is open to interpretation and hence capture by well-organized interests with access to decision-makers.

Implementation failures arise in situations where the law is not administered in a manner anticipated by the statute. There are a number of possible reasons for this. Some of these reflect the choices made by the regulator: they have chosen the wrong enforcement strategy;⁹⁹ they have developed rules that are unworkable or reflect the wrong judgment on the balance between benefits and costs; they communicate badly with the regulated sector which does not know what is expected of it; or they do not give enough attention to the challenges of initial implementation when a significant shift in attitudes and capabilities is required.¹⁰⁰

Others reasons for implementation failure are associated with features of the regulator’s internal and external operating environment over which they may have limited control. The

⁹⁸ Martin Lodge, “Competition, Innovation and Regulation: The Regulatory State and Policy Failure: Regulatory Regimes in Britain and Germany” (Paper presented at the 51st Political Studies Association Conference, Manchester, UK, April 10-12, 2001), 6.

⁹⁹ Robert Baldwin, “Regulation: After ‘Command and Control’,” in *The Human Face of Law*, ed. K. Hawkins (Oxford: Clarendon Press, 1997),

¹⁰⁰ See L. B. Lave, “Health, Safety, and Environmental Regulations,” in *Setting National Priorities: Agenda for the 1980s*, ed. Joseph A. Pechman (Washington, D.C.: The Brookings Institution, 1980), on the need for improved implementation; and Kathleen Thelen and Sven Steinmo, “Historical Institutionalism in Comparative Politics,” in *Structuring Politics*, ed. Sven Steinmo, Kathleen Thelen and Frank Longstreth (Cambridge: Cambridge University Press, 1992), 18, for a discussion on institutional ‘stickiness’ in the face of change.

implementation literature identifies regulator culture, discretion, incentives, and accountability, and the links between these, as materially affecting what regulators do 'in the field', which in turn is very important to the regulatory outcomes that are achieved.¹⁰¹ For example, regulator culture, or the entrenched attitudes and routines of the regulators, affects outcomes, but these are in turn influenced by how much discretion regulators have, and how accountable they are in situations where they do have discretion.¹⁰² Some writers have emphasised the particular problems associated with multilevel governance, where the administration of the law is shared by federal and state governments, or in a unicameral political system, central and local government.¹⁰³

The notions of design and implementation failure contain an implicit assumption that regulatory failure can be avoided through better design or better implementation, and that this is within the capacity of the state. There is, however, a literature that emphasises the limitations of the state when it comes to setting and enforcing standards.¹⁰⁴ Associated with Teubner and Foucault, and described as 'autopoiesis', 'decentred' or 'reflective' regulation, this literature posits that to a large extent society regulates itself. Regulatory failure occurs

¹⁰¹ For an analysis of factors affecting regulator performance see: Eugene Bardach and Robert. A. Kagan, *Going by the Book: The Problem of Regulatory Unreasonableness* (Philadelphia: Temple University Press, 1982).

¹⁰² See Robert A. Kagan, "Regulatory Enforcement," in *Handbook of Regulation and Administrative Law*, ed. David H. Rosenbloom and Richard D. Schwartz (New York: M Decker, 1994); Robert. D. Behn, *Rethinking Democratic Accountability* (Washington, D.C: Brookings Institution Press, 2001); Giandomenico Majone, *Regulating Europe* (London: Routledge, 1996).

¹⁰³ See Peter J. May, "Can Cooperation be Mandated? Implementing Intergovernmental Environmental Management in New South Wales and New Zealand., *Publius, The Journal of Federalism* 25: 1 (1995).

¹⁰⁴ This discussion was based on the following sources: Julia Black, *Critical Reflections on Regulation* (London: The London School of Economics and Political Science, 2002); Neil Gunningham and Joseph Rees, "Industry Self-Regulation: An Institutional Perspective," *Law and Policy* 19: 4 (1997); Neil Gunningham and Richard Johnstone, *Regulating Workplace Safety: Systems and Sanctions* (Oxford: Oxford University Press, 1999); Robert Baldwin, "Regulation: After 'Command and Control'," in *The Human Face of Law*, ed. K. Hawkins (Oxford: Clarendon Press, 1997); T. Wilthagen, "Reflexive Rationality in the Regulation of Occupational Health and Safety," in *Reflexive Labour Law*, ed. R. Rogowshi and T. Wilthagen (Kluwer, Deventer, 1994); Gunther Teubner (ed.), *Autopoietic Law: A New Approach to Law and Society* (Berlin: Walter de Gruyter, 1988); Gunther Teubner, "Substantive and Reflexive Elements in Modern Law," *Law & Society Review* 17 (1983); Peter N. Grabosky, "Using Non-Governmental Resources to Foster Regulatory Compliance," *Governance: An International Journal of Policy and Administration, and Institutions* 8: 4 (1995).

when the state assumes that it has the capability to modify behaviour independent of the non-state regulatory landscape.

In a decentred world, behaviours are significantly influenced by the norms, rules and practices of self-governing groups that people belong to. These include clubs, professions, families, communities, firms and industries. Central authorities do not have enough knowledge to anticipate how these groups and their members will respond to the imposition of standards which may be alien to them or in conflict with what currently governs their behaviour. The knowledge gap in part reflects complexity; there can be a large number of groups within a particular regulatory domain each with their own characteristics. It also reflects the fact that the knowledge does not in some cases exist until an intervention by the central authority is actually tried. This leads to unintended consequences which can generally be described as the law not achieving its objectives, but more specifically results in: ' . . . the indifference of the 'target' system to the intervention, the destruction of the 'target' system itself, or the destruction of the intervening system.'¹⁰⁵

At one level a realization of the limitations of the state could be reflected in the choice of regulatory approach, or even the operating principles and routines of the administering agency. Preferred regulatory approaches are those that provide flexibility or are based on incentives rather than prescriptive standards, as they are better able to adapt to a heterogeneous regulated sector, changing circumstances, or incoming information on how the law is working in practice. The encouragement and facilitation of self-regulation based on socially desirable norms, rules and practices also allows the state to work with extant self-governing groups, rather than substitute for them. A strategy based on cooperation has implications for the approach taken by regulators. They steer rather than row, and negotiate rather than direct.¹⁰⁶ They also have in place effective feedback systems, and develop a

¹⁰⁵ Julia Black, *Critical Reflections on Regulation* (London: The London School of Economics and Political Science, 2002), 5 - describing Teubner's 'regulatory trilemma'.

¹⁰⁶ Ibid.: 6.

capacity to respond appropriately to challenges to the regulatory goals. In short, acceptance of a decentred world does not lead to a wholly pessimistic view of the role and capacity of the state, and it might well be argued that the decentred literature simply identifies another set of factors that need to be taken into account in the design and implementation of regulatory regimes. This would, however, be understating the challenge, which is for the state to make space for alternative governance and incentive structures.

There is a further literature that provides insights into the challenges of introducing a significant new regulatory regime. The central premise is that significant regime change depends on fundamental changes to how society has traditionally thought and acted. These include: the beliefs and values of both the regulators and those who are regulated; the rules of thumb that people use to make decisions when faced with complex and uncertain information; the norms and rules that have developed to govern transactions, and define and penalize aberrant behaviors; and the institutions that promote the norms and administer the rules thus encouraging conformity and compliance.

The more deeply a particular way of doing things is embedded in the fabric of society, the more difficult it is to effectively introduce a new regime. This idea underpins the theory of path dependency, which conveys the idea that choices made in the past constrain the choices that are available in the present or future.¹⁰⁷ It is also reflected in punctuated equilibrium theory. While the genesis of this theory was in the biological sciences (as an explanation of the evolutionary process), it has been applied to regime change generally.¹⁰⁸ In essence, it postulates that in situations where significant change is contemplated, negative and positive feedback act together to create inertia, possibly for an extended period of time, until a tipping point is reached. At this point change occurs that can be both rapid and dramatic.

¹⁰⁷ See Douglass C. North, *Understanding the Process of Economic Change* (Princeton: Princeton University Press, 2005).

¹⁰⁸ R. Repetto (ed.), *Punctuated Equilibrium and the Dynamics of U.S. Environmental Policy* (New Haven, Conn: Yale University Press, 2006).

The insight that can be taken from both path dependency and punctuated equilibrium theories is that significant regime change cannot just be difficult, it can be impossible at least within timeframes contemplated by the architects of such regimes. These theories also suggest that the implementation of novel regulatory regimes can be highly unpredictable, both in terms of what happens and when. This suggests that implementation should be accompanied by active risk scanning and contingency planning, and a willingness to intervene to put a reform back on track, or strengthen or compensate for weaknesses that are revealed.

Sources of failure in command and control regulatory regimes

Performance-based regulation falls within the scope of a regulatory approach often described as 'command and control'. Historically, command and control regulation has been based on prescriptive standards. In general the benefits of this popular approach are that acceptable or unacceptable goods, services or behaviors can be specified with some immediacy and accuracy, and required or prohibited by law.¹⁰⁹ It has also come in for considerable criticism; with a shift to performance-based standards as one of the responses to this.

It is necessary to distinguish between failures that can be associated with command and control regulation based on prescriptive standards, and those that arise because the standards are performance-based. I have done this by identifying what the literature says about problems with historic command and control regulation (noting that this is in effect a commentary on an approach based on prescription), and then what it identifies as the specific problems with performance-based regulation. The objective is to isolate factors that might create a *different* or *heightened* risk of regulatory failure with performance-based regulation.

¹⁰⁹ Robert Baldwin, "Regulation: After 'Command and Control'," in *The Human Face of Law*, ed. K. Hawkins (Oxford: Clarendon Press, 1997), 66.

Problems with traditional command and control

The literature on command and control regulation identifies a number of problems, but these can generally be classified under two headings: problems with standards-setting; and problems associated with complexity and inflexibility.

Technical regulations often embody both scientific knowledge and assumptions on the costs and benefits of regulating to achieve a certain outcome. For example, a regulation that prohibits the use of a particular ingredient in food reflects scientific knowledge on the risks and consequences of using that ingredient, and the costs and benefits of permitting or prohibiting its use.

The literature on command and control regulation points to the problem that technical regulations may not accurately reflect community expectations in relation to costs, benefits and risks. Community expectations may not be reflected for a number of reasons: the regulation-making process could be ‘captured’ by special interests who promote their preferences over those of the community;¹¹⁰ there could be methodological problems associated with establishing societal preferences, for example revealing society’s tolerance for risk given the cost of mitigating risk;¹¹¹ or problems with the regulation-making process which, while not subject to capture *per se*, either does not take into account of, or even alienates, affected parties, and/or is simply analytically weak.¹¹²

¹¹⁰ Robert Baldwin, “Regulation: After ‘Command and Control’,” in *The Human Face of Law*, ed. K. Hawkins (Oxford: Clarendon Press, 1997); Marc Allen Eisner, “Economic Regulatory Policies: Regulation and Deregulation in Historical Context,” in *Handbook of Regulation and Administrative Law*, ed. David H. Rosenbloom and Richard D. Schwartz (New York: M. Decker, 1994); Cass R. Sunstein, *After the Rights Revolution* (Cambridge Massachusetts: Harvard University Press, 1990).

¹¹¹ Gary C. Bryner, “Trends in Social Regulation,” in *Handbook of Regulation and Administrative Law*, ed. David H. Rosenbloom and Richard D. Schwartz (New York: M. Decker, 1994); Paul C. Stern and Harvey V. Fineberg (eds.), *Understanding Risk: Informing Decisions in a Democratic Society* (Washington, D.C: National Academy Press, 1996).

¹¹² Michael E. Kraft and Norman J. Vig, “Evaluating Technology through Public Participation. The Nuclear Waste Disposal Controversy,” in *Technology and Politics*, ed. Michael E. Kraft and Norman J. Vig (Durham: Duke University Press, 1988); David Vogel, *National Styles of Regulation: Environmental Policy in Great Britain and the United States* (Ithaca, New York: Cornell University Press, 1986); Phil Brown, “Popular

The second major criticism of command and control regulation is that it has, over time, resulted in regulatory regimes that are both complex and inflexible. The effect is regulations that are hard to comply with, either by themselves or in association with other parts of the regulatory regime;¹¹³ regulations that are not tailored to the specific characteristics of the regulated entities, resulting in inefficiency and on occasion making them unworkable;¹¹⁴ regulations that are not flexible enough to keep up with changing circumstances; regulations that create uncertainty as to what does or does not comply;¹¹⁵ and regulations that inhibit the development of least-cost approaches to achieving regulatory goals and innovation generally.¹¹⁶

Problems with performance-based command and control

A common theme in the literature on performance-based regulation is that, compared with traditional command and control regulation, it can be even more difficult to create the link between community expectations and technological solutions. In essence, in a performance-based regulatory regime the regulator may be required to make a set of judgments that

Epidemiology: Community Response to Toxic Waste-Induced Disease in Woburn, Massachusetts," *Science, Technology and Human Values* 12(3-4), 1987.

¹¹³ Robert Baldwin, "Regulation: After 'Command and Control'," in *The Human Face of Law*, ed. K. Hawkins (Oxford: Clarendon Press, 1997); Cass R. Sunstein, *After the Rights Revolution* (Cambridge Massachusetts: Harvard University Press, 1990).

¹¹⁴ Eugene Bardach and Robert. A. Kagan, *Going by the Book: The Problem of Regulatory Unreasonableness* (Philadelphia: Temple University Press, 1982).

¹¹⁵ Gary C. Bryner, "Trends in Social Regulation," in *Handbook of Regulation and Administrative Law*, ed. David H. Rosenbloom and Richard D. Schwartz (New York: M. Decker, 1994); Ian Ayres and John Braithwaite, *Responsive Regulation: Transcending the Deregulation Debate* (Oxford: Oxford University Press, 1992); Robert Baldwin, *Rules and Government* (Oxford: Oxford University Press, 1995); Eugene Bardach and Robert. A. Kagan, *Going by the Book: The Problem of Regulatory Unreasonableness* (Philadelphia: Temple University Press, 1982).

¹¹⁶ Neil Gunningham and Richard Johnstone, *Regulating Workplace Safety: Systems and Sanctions* (Oxford: Oxford University Press, 1999).

traditionally have been made incrementally and over time, on the basis of trial-and-error, through a process of building up and building on prescriptive standards.

For example, a regulator is asked to approve a novel technology for constructing buildings. They must assess the performance of the technology against the mandatory performance requirements in all the circumstances of its use, recognizing that in some cases actual testing cannot be done. Having regard to the benefits of this technology (it might for example significantly reduce production costs) they must assess the risk of it not performing as expected and consequences if it failed, and set this against the benefits. They must then do an overall calculation that the benefits to the community outweigh the costs, adjusted for the risk, or not as the case may be.

Brannigan & Kilpatrick identify the process of linking societal objectives with available technologies in a performance-based regulatory regime as being technically difficult, and imply that the practical effect is that the judgments are in fact made by the technologist, who has technical knowledge, but not the expertise or mandate to define society's risk preferences.¹¹⁷

Performance-based regulation is promoted primarily to provide flexibility and encourage innovation. However, the literature points to the fact that performance-based regulation has resulted in greater uncertainty. Rather than uncertainty arising out of complexity, as is the case with historic command and control regulation, with performance-based regulation uncertainty is a by-product of providing greater flexibility and choice. The goal is specified but not the means of compliance. At the extreme end of the spectrum designs, products and processes are 'one-offs', which require a judgment to be made on compliance which, as noted above, can be costly and technically difficult. To emphasise the point, Bukowski *et al.* argue that: '... it is not desirable for performance-based regulations to be "context-specific", as the

¹¹⁷ Vincent Brannigan and Anthony Kilpatrick, "Fire Scenarios in the Enforcement of Performance-Based Fire Safety Regulations," *Journal of Fire Sciences* 18: 5 (2000). 359-361.

most important aspect of the PBRS is the flexibility to address as many different design contexts as possible.’¹¹⁸

Braithwaite has suggested that given this uncertainty, the enhanced ability with prescriptive standards to clearly define what is acceptable and for a government to undertake monitoring and enforcement, should make them the favoured approach in critical areas of health and the environment.¹¹⁹ Coglianese & Lazer adopt a similar position, noting that: ‘Performance-based regulation, while attractive for the flexibility it permits regulated firms, will be effective only where the regulator can cheaply measure output and evaluate its social impact.’¹²⁰ Ogus also notes that monitoring compliance with prescriptive standards has lower administrative costs for the regulator.¹²¹ The alternative is that in situations of technical uncertainty the regulator must assume a bigger role in evaluating compliance with regulatory objectives.

Uncertainty also gives rise to accountability problems. The difficulties associated with linking community objectives with technological solutions can reduce the incentives on those responsible for determining societal expectations to run as analytically robust a process as possible given the constraints, and also provide opportunities for capture by vested interests. In relation to compliance, if it is difficult to measure whether a good or service has met a performance requirements it is also difficult to hold to account both producers who are expected to comply, and those who are expected to approve goods and services as complying. While these problems arise in traditional command and control regulation, they appear to be magnified by performance-based regulation, to the extent that May suggests that:

¹¹⁸ Richard W. Bukowski et al, “Standards Linkages to a Performance-Based Regulatory Framework” (paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001), 5.

¹¹⁹ John Braithwaite, “The Limits of Economism in Controlling Harmful Corporate Conduct,” *Law and Society Review* 16:3 (1981/1982), 488-490.

¹²⁰ Cary Coglianese and David Lazar, *Management-Based Regulation: Prescribing Private Management to Achieve Public Goals* (Washington DC: AEI Brookings Joint Center for Regulatory Studies, 2002), 38-49.

¹²¹ Anthony I. Ogus, *Regulation: Legal Form and Economic Theory* (Oxford: Clarendon Press, 1994), 167.

‘Accountability is a fundamental and thorny issue for performance-based regulations and as such is the Achilles’ heel of this form of regulation.’¹²²

Finally, the literature provides some commentary on possible reasons for the failure in the New Zealand building control regime. May’s study of the failure is the primary source. This study identifies the following: technical problems with the formulation of the performance standards in the Building Code, specifically that they were ‘insufficiently precise’ to enable an accurate assessment as to whether alternative solutions were compliant with them; weak regulatory oversight; and a lapse of professional standards by builders.¹²³ In addition to identifying an issue with accountability (resulting from imprecise performance standards which permitted weak regulatory oversight and professional standards), May noted that the introduction of the building control regime was associated with a policy shift from reliance on the state to market controls.¹²⁴ Brannigan & Kilpatrick also observed that: ‘Some of the descriptions of the New Zealand performance-based code experiences would seem to indicate that the public sector, at least for a time, abandoned public regulation of building safety.’¹²⁵

Conclusion

Traditional command and control regulation, based as it is on prescriptive standards, creates many challenges. These range from: designing and maintaining standards that meet community expectations when the latter are difficult to assess, change over time, and contain inherent tensions between competing objectives; managing the risks of capture by special interests; and ensuring adequate compliance, given inevitable constraints on the capacity of regulators and the state generally to monitor and enforce the law.

¹²² Peter J. May, “Performance-Based Regulation and Regulatory Regimes: The Saga of Leaky Buildings,” *Law and Policy* 25: 4 (2003), 397.

¹²³ Peter J. May, “Regulatory Regimes and Accountability,” *Regulation & Governance* 1: 1 (2007), 18. The reference to the formulation of performance standards as a technical problem can be found on pg. 21.

¹²⁴ Peter J. May, “Performance-Based Regulation and Regulatory Regimes: The Saga of Leaky Buildings,” *Law and Policy* 25: 4 (2003), 392.

¹²⁵ Vincent Brannigan and Anthony Kilpatrick, “Fire Scenarios in the Enforcement of Performance-Based Fire Safety Regulations,” *Journal of Fire Sciences* 18: 5 (2000): 361.

Performance-based regulation is subject to the same demands as other forms of command and control regulation. Promoted as a means by which some of the problems with traditional command and control regulation can be addressed, particularly those that arise from the stock of complex and inflexible prescriptive rules, the literature also points to the fact that the flexibility performance-based regulation introduces carries with it more uncertainty. Uncertainty results because measuring whether a novel design, product or process that is held out as meeting mandatory performance requirements can be both technically difficult and costly.

The overriding concern is that these ‘novel approaches’ can have a significant social content. In other words, they can reflect a judgment that notwithstanding technical uncertainty and adverse consequences for the community if the approach fails to meet the performance requirements, it is worth taking the risk because of the benefits that will result from adopting the approach. The result of the measurement problem is that something may be approved (if the law requires *ex ante* approval) or permitted to remain on the market (if the law is based on *ex post* monitoring of compliance) which is socially sub-optimal, or not approved/permitted when it is socially desirable. There are also spill-over costs to the regulated entities as they cannot be certain that what they are proposing or doing actually complies with the law.

However, while these features of performance-based regulation may be source of regulatory failure, this chapter has illustrated that there are many reasons why regulatory regimes fail. Informed by these insights, the following two chapters explore the sources of failure in the performance-based building control regime, with a view to determining whether its performance character either directly or indirectly contributed to, or resulted in, the failure of the regime.

Chapter 4: What factors contributed to dwellings failing to perform as expected?

Background

This chapter analyses the empirical information that is available on the possible causes of the problem of building quality; the sequence of actions or inactions that ultimately led to a large number of dwellings being built that leaked, or are at risk of leaking, over the period of a decade. This information takes the form of expert opinion and the collective views of commissions of inquiry and judicial judgment. The purpose is to identify one or more phenomena that have greatest explanatory salience.

Introduction

Various explanations for the problem of building quality have been proposed. Some of these were no doubt influenced by self-interest; in particular to deflect blame onto somebody else. Others were influenced by the vantage point of the commentator. For example, those involved in design or construction might focus on the performance of the designers, builders or inspectors. Those involved in the standards-making process might focus on the adequacy of the standards and the roles of those who participated in the making of standards. Making sense of a complex set of factors; that is, building a coherent and accurate picture of cause and effect, is challenging.

As discussed in the methodological chapter, Yin provides guidance on case study research and in this context proposes an iterative explanation-building process.¹²⁶ Based on an initial set of empirical information, one or more propositions are developed. A second set of empirical information is then drawn on and the initial propositions are either confirmed or revised, and so on. In this case there have been three iterations.

¹²⁶ Robert K. Yin, *Case Study Research: Design and Methods* (2nd ed.) (Thousand Oaks: Sage Publications, 1994).

The first iteration is based on some 200 determinations relating to monolithic-clad houses which were made by the Department of Building and Housing (DBH) in the period 2005/06.¹²⁷ The determination process is a dispute resolution procedure established by the Building Act 2004. It is a ‘business as usual’ feature of the law, but a large proportion of the cases considered by the DBH over this period related to monolithic-clad dwellings. In the case of monolithic-cladding the ‘standard case’ was a territorial authority refusing to issue a code compliance certificate for a building constructed of monolithic cladding, and the homeowner seeking a determination from the DBH on whether the building did or did not comply with the building code. Determinations are based on a detailed and expert assessment of a specific building and in aggregate provide good information on underlying problems with the performance of monolithic-clad buildings in general.

The second iteration is based on 16 adjudications carried out under the auspices of the Weathertight Homes Resolution Service, as well as two court cases which focused on the liability of the Building Industry Authority (BIA).¹²⁸ They involved a detailed assessment of the circumstances leading to building failure, as well as the nature of the failure itself, and assigned legal liability. In all cases expert witnesses were called, and evidence taken from both plaintiffs and defendants.

The third iteration is based on two inquiries that were carried out into the leaky building crisis, by the Hunn Committee and the Government Administration Select Committee. The Ministry of Economic Development also carried out a review. However this review drew heavily on the Hunn Committee report in particular, and focused on regulatory solutions rather than

¹²⁷ Eighty-five determinations were reviewed, from a total of 197. Sixty-five of the 177 determinations issued in 2005 were reviewed, and all 20 of the 2006 determinations issued at the point I undertook the review. By that stage a clear pattern had been identified. Determinations can be found at <http://www.dbh.govt.nz/determinations-view-past-determinations>.

¹²⁸ Sixteen adjudications were reviewed in detail, comprising 36 percent of all reported adjudications to 6 September 2006. The balance of the adjudications was subject to a cursory review to identify whether there were any inconsistencies with the findings from the detailed reviews. The two court cases were the seminal cases that assessed the liability of the BIA relative to other participants. Adjudications can be found at <http://www.justice.govt.nz/wht/decisions>.

problem identification. The Hunn Committee consulted widely, and the Government Administration Select Committee called for submissions, heard oral evidence, and appointed industry and legal experts as advisors.

Reference was made in the methodology chapter to ‘tiers of decision-making’, as a systematic approach to mapping combinations of factors that may contribute to the outcome which is the subject of analysis. The following tiers of decision-making were deduced from the various reviews that were undertaken.

- Tier 1 International and domestic standards bodies, research organizations, industry bodies, interest groups, and regulators making or contributing to decisions that affect building standards and rules.
- Tier 2 Courts and other judicial bodies, making decisions that affect rights and obligations of participants in the building regulatory system.
- Tier 3 Central government politicians, policy agencies and regulators making or contributing to decisions that set mandates, set priorities and allocate resources to rule-making, assessments and approvals, and monitoring and enforcement functions.
- Tier 4 Local government politicians, policy agencies and regulators making or contributing to decisions that set mandates, set priorities and allocate resources to rule-making, assessments and approvals, and monitoring and enforcement functions.
- Tier 5 Regulators and their advisors (product assessment bodies and peer reviewers) undertaking approval functions or contributing to these functions.
- Tier 6 Designers, builders, manufacturers, developers, research bodies and experts making or contributing to decisions that affect the compliance of specific buildings with relevant standards and technical regulations.
- Tier 7 Owners, occupiers and users of buildings making or contributing to decisions about what to purchase, how much monitoring of providers to undertake, levels of maintenance required and when to complain about poor quality.

First iteration: determinations

Introduction

The facts of the matter are clear. The failure of monolithic-clad buildings resulted from water penetrating the building envelope causing rotting of interior timber. Buildings leak if they have not been well constructed.

Given these facts it might be concluded that the cause of the leaky building problem was poor quality workmanship. However, in reading the determinations one was struck by a recurring conclusion by the DBH, that the cladding was generally installed in accordance with good trade practice, but some details were not well constructed. Adding up the numbers, this conclusion was reached in a full 82 percent of the determinations reviewed. In the remaining 18 percent the conclusion was that the performance of the cladding was not satisfactory because it had not been installed in accordance with good trade practice.

Why would builders who are generally capable of good trade practice deviate from such practice given the consequences for the performance of the building and ultimately the liability of the builder?

Background to determinations

Determinations are made by the DBH in situations where a territorial authority or owner cannot reach agreement on whether the design or construction of a building meets the performance requirements of the building code.

In the cases I reviewed, territorial authorities had declined to issue a code compliance certificate attesting that the authority was satisfied on reasonable grounds that the building as constructed was code compliant.

Territorial authorities generally declined certificates in two circumstances. The first was when a building had been inspected, and the inspection revealed a number of features that were associated with leaky buildings, primarily items not installed as per the manufacturer's specifications, accepted trade practice or acceptable solutions, in situations where there was not a ventilated cavity system. The second was when the territorial authority had taken over the regulatory process from a private building certifier and claimed that they did not have enough information to assess whether the building complied with the building code.

On receipt of a request for a determination the DBH engaged an expert to carry out an assessment of the building in question. In almost all cases the building was found to have failed one or both of the performance requirements of the building code that related to weathertightness, namely E2 – External Moisture and B2 – Durability. Buildings failed E2 if there was evidence of leaking. They failed B2 if there were features that might result in the building leaking at some time in the future.

In all cases the DBH concluded that the construction of the building was at fault. For example, the builder had not allowed enough space between the ground and the cladding, the detailing of flashings was not adequate or sealants had not been used where required. In situations where cladding had generally been installed correctly, but there were some deficiencies, the DBH concluded that the rectification of these would result in the building complying with the building code.

Standards of workmanship

It can be inferred from the determinations that manufacturers' specifications and general standards of workmanship (described as 'good trade practice') were sufficiently comprehensive that if a builder 'went by the book', the building as constructed would be watertight. Most builders (some 82 percent) carried out their work competently, but made some mistakes. These mistakes resulted in the buildings either failing, or being at risk of failing, the requirements of the building code.

It can, however, be plausibly argued that there is one standard of workmanship required to meet the requirements of the building code, and another that has connotations of building to a price. The former is the minimum required by law and sets a quality ‘floor’. The latter depends on what consumers demand and are prepared to pay for. It may equally be what builders think they can get away with, or are in line with industry norms which may not equate to ‘best practice’. What standard of workmanship were the generally competent builders building to?

The determinations provide evidence that builders who were generally competent were prepared to let their standards of workmanship fall below what would be regarded as ‘best practice’. However, a case can be mounted that these builders were not aware that the standards they were prepared to accept were below the minimum required to ensure the building met the performance requirements of the building code. The basis of this argument is that the criteria that the DBH used to assess the standards of workmanship were developed after many of the buildings that were subject to the determinations were constructed. This criteria was first promulgated by the BIA in 2004 and takes the form of a risk matrix.

The matrix allows an assessment to be made of the risk of a weathertightness failure (the risk that a building will not only leak but also rot), and assigns a high, medium or low rating. The matrix comprised a number of variables, including the nature and complexity of the design, the wind exposure of the building, the presence of a cavity, and whether the framing timber is treated or not. In essence, the higher the risk the better standard of workmanship required. A consultant engaged by a territorial authority to assess a building brought this into sharp focus:

In the consultant’s opinion, the design of the house, the exposed site, and the timber treatment meant that quite exceptional standards of workmanship were needed if compliance with the Building Code was to be achieved.¹²⁹ (My underlining).

It could be assumed that if they had the relevant information, competent and motivated builders would assess and compensate for the risks identified by the risk matrix. As

¹²⁹ Determination 2005/161 Rodney District Council v Jeremy Massingham Family Trust, 3.

demonstrated by subsequent events, builders paid heavily for their lack of care. The financial cost to builders was very high. Some went out of business. However, given that the matrix was not promulgated by the BIA until 2004, well after many of the buildings that were subject to determinations were built, it might be concluded that builders did not know *ex ante* the standards of workmanship required to ensure that a specific building design, located in a specific site, met the performance requirements of the building code.

Standards of maintenance

The determinations provide one additional insight. Most if not all concluded with a simple statement that the cladding will require on-going maintenance to ensure its continuing code compliance. This statement was independent of the particular circumstances of a specific building; it applied to all monolithic-clad buildings. What this means in practice is that, notwithstanding the level of workmanship of the builder or installer, the building could still fail if it was not maintained over its life. The reason for this is that monolithic-clad buildings without a cavity and with untreated timber fail when they allow water ingress, and therefore the integrity of the coating is critical (and affected by events such as frequency of painting or damage from being struck by a hard object), as are the materials used to join and seal. In this regard, while the building code requires dwellings to be durable for at least fifty years, the cladding only has to last twenty years, and the jointing materials only five years.

Based on the determinations can we conclude that the problems with monolithic-clad buildings were the fault of the builders and installers? Clearly the quality of workmanship was a contributing factor. However, it can also be inferred that builders lacked some important information on the sensitivity of monolithic-clad building systems to the quality of construction. The lack of this information may have affected the standard of care provided by generally competent builders. There is a broader question about the merits or otherwise of putting onto the market a product that was highly sensitive to the quality of workmanship in the certain conditions. Looking forward, the ongoing performance of the buildings is dependent on the quality of maintenance.

Figure 5 illustrates the primary factors that I have been identified in this first iteration that are, or in the future could be, associated with the failure of dwellings.

Figure 5: A simple picture of why dwellings failed

Second iteration: adjudications and court action

Introduction

Generally competent builders built buildings that failed, to designs that were dependent on homeowners paying very careful attention to maintenance over the life of the building. Why did this situation arise? In seeking to assign legal liability the adjudicators and courts listened to the arguments from all sides and called on experts. They identified a trail of decision-making that went all the way back to the BIA and beyond, but ultimately settled liability on those at the front line: builders, developers and territorial authorities.

This second iteration identifies a number of behaviours, engaged in by a wide range of participants in the building control regime, which contributed to the failure of buildings. In doing so it highlights an important distinction between legal liability and responsibility.

Background to adjudications and court action

The Weathertight Homes Resolution Service (WHRS) Act 2002 was established to: ‘. . . provide owners of dwellinghouses that are leaky buildings with access to speedy, flexible, and cost-effective procedures for assessment and resolution of claims relating to those buildings.’¹³⁰ It is essentially a two-part process. The first part enables homeowners who consider they have a leaky building to have their particular problem assessed. The assessor forms a view as to:

1. the cause of water entering the dwellinghouse; and
2. the nature and extent of any damage caused by the water entering the dwellinghouse; and
3. the work needed to make the dwellinghouse watertight and repair that damage; and
4. the estimated cost of that work; and
5. the persons who should be parties to the claim.

The assessment report is provided to the owner. The owner then has a choice. They might decide to do nothing, or to use the report in a private negotiation with the builder or installer. Alternatively they could use one of the two formal dispute resolutions mechanisms provided by the WHRS Act.¹³¹ One mechanism is mediation, and this involves the owner and any of the parties against whom the owner is making a claim agreeing to refer the claim to a mediator provided by the Weathertight Homes Resolution Service (WHRS). The proceedings and resolution are confidential.

Alternatively, owners can have their claims referred to WHRS-appointed adjudicators whose decisions, subject to appeal, are binding and enforceable, and published. The WHRS website describes this process as follows:

¹³⁰ Government Administration Select Committee, Inquiry into the Weathertightness of Buildings in New Zealand (Wellington: New Zealand, March 2002), 84.

¹³¹ The WHRS Act was amended in 2006. Included amongst the changes was the replacement of the existing adjudication arrangements with a Weathertight Homes Tribunal. I have described the arrangements as they were under the WHRS Act 2002, as I examined adjudications made pursuant to this Act.

Like a court hearing, the adjudication process is generally adversarial, allowing parties to question each other's evidence, claims and credibility. The adjudicator, however, may adopt an inquisitorial approach. Homeowners will need to clearly state their claims against each other party and prove these claims. Legal representation and other expert advice or representation is permitted in adjudication and parties may use this to help them prepare for and argue their case.¹³²

The body of empirical information that has been drawn upon in this second iteration also includes proceedings of two court cases which dealt with the key question of whether the BIA was liable for the failure of buildings. The first of these cases related to a condominium development, known as Sacramento, which was owned by Body Corporate 200200. Body Corporate 200200 claimed that the leaking of a number of units in this development resulted from defaults by those who participated in the design, construction and inspection process, and the BIA, and sued them all.¹³³ The second court case was an appeal by the BIA against a decision by the High Court in the first case not to strike out the claim against it.¹³⁴ The Court of Appeal allowed this appeal.

Assignment of liability

The adjudication reports and proceedings of the court cases provide an important picture of the performance-based building control landscape in the 1990s and early 2000s. It is a complex picture of common law, contractual and statutory obligations which could be broadly be described as establishing conduct, or 'duty of care', standards, and technical standards comprising the performance requirements set out in the building code, industry guides and manufacturers' specifications. The analysis of the adjudications and courts cases bring more participants into play than do the determinations: territorial authorities, developers, architects, manufacturers, vendors and the BIA.

¹³² Department of Building and Housing. <http://www.dbh.govt.nz/whrs-adjudication-index> (accessed June 1, 2009).

¹³³ *Body Corporate 200200 & Anor v Approved Building Certifiers Ltd & Ors* unreported, HC Auckland, CIV 2003 404 512, 2 February 2005, Williams J.

¹³⁴ *Attorney-General v Body Corporate No 200200* [2007] 1 NZLR 95.

The outcomes from the adjudications and court action can be summed up as follows. Those participants who were directly involved in the construction work or its oversight are found legally liable. They included builders/installers, developers, and territorial authorities in relation to their inspection function. Those participants who were one or more steps removed from the construction work, or its oversight, are not found liable. They included architects (unless they were undertaking supervision), manufacturers (so long as their products were not faulty), and the BIA.

The case against builders, developers and territorial authorities

Liability was assessed against both conduct and technical standards. The conduct standards that were applied to builders, developers and territorial authorities arose primarily out of common law and the Building Act 1991, but there was also recognition that builders and developers had contractual obligations, and in some cases the Fair Trading Act 1986 was applied. While these participants often shared liability in a particular case, the builders had the strongest obligation as they actually carried out the work.

The position in relation to builders and developers can be summed up as follows:

1. The builder or developer of a house owes a duty of care in tort to future owners.
2. That duty is to take reasonable care to build the house in accordance with the building permit and building code.
3. That duty generates a special responsibility or duty to see that care is taken by others, for example by an agent, or independently employed contractors.

The position in relation to territorial authorities can be summed up as follows:

1. Local authorities must exercise reasonable care not to allow houses to be built in breach of the building permit and building code.
2. Local authorities are not under any absolute duty of care; they must act as a reasonable, prudent council would do.

3. The standard of care can depend on the degree and magnitude of the consequences that are likely to ensue.

The technical standards that applied were drawn from three sources. The first of these is the specific provisions of the building code that relate to water penetration, namely E2 (buildings must be constructed to resist the penetration and accumulation of water). This test was applied strictly. If there was evidence of water penetrating causing damage then the test was failed. The second of these was the manufacturer's specifications relating to those building elements that were associated with the risk of water penetration, such as the cladding system. Again, this test was applied strictly. If the penetration of water and subsequent damage could be attributed to not meeting the manufacturer's specifications then the test was failed. The third was industry guides and standards, and in particular the Stucco Good Practice Guide, first published by BRANZ in 1996. These guides and standards were not applied strictly, but provided backup information to support judgments that industry best-practice was not applied.

An informed judgment required when exercising duty of care

The story becomes interesting at the point where the conduct standards interface with the technical standards.

Builders and Developers

For builders and developers a direct relationship was identified in the adjudications between a building that leaked (or was at risk of leaking as a result of the workmanship) meaning that the performance requirements of the building code were not met, and a lack of adherence with the manufacturer's specifications. The inference was that if the manufacturer's specifications had been complied with the building would not have leaked. Legal liability was assigned accordingly.

This implies that there is no room for judgment, and no margin for error. A deeper examination of the adjudications reveals that the scope for judgment was in fact acknowledged. For example, an Adjudicator noted that: 'It is not intended that every building should be a model of perfection in construction but that it should reach a certain standard

which achieves the objectives of the Code.’¹³⁵ Another took the view that even compliance with the manufacturer’s specifications may not be enough: ‘It is not enough . . . for the construction to comply with the letter of the Harditex Technical Information sheets, it must also comply with the Building Code itself.’¹³⁶

Therefore, compliance with the performance requirements of the building code is the ultimate test that must be applied by builders/developers. This requires a judgment as to compliance to be made. At the time were builders/developers equipped with the necessary knowledge to make accurate judgements? An assumption was made in the adjudications that they did have knowledge on the risk of monolithic-clad buildings, and were therefore in a position to make an accurate judgment on the level of care required in construction to meet the requirements of the building code. The basis of this assumption appears to have been an article published in February 1995 in *Build* magazine on problems that had been observed with monolithic-clad building construction, as referenced in the following observation by an Adjudicator: ‘The true situation in 1997, in fact much earlier than that, is helpfully recorded in the *Build* February 1995 article; ‘Solid Plaster – Have we forgotten how to do it?’¹³⁷

Did this article by itself provide sufficient information to alert builders to both the risk and consequences of leaking? Three key paragraphs in the article are germane to this question:¹³⁸

The performance of solid plaster on light timber framed buildings constructed during the past three to four years has been, in many instances, poor. Although there are many good jobs out there, an alarming number of buildings have been clad with solid plaster that displays severe and uncontrolled cracking, causing leakage. This also spoils the look of the building and the owners look to others for remedial action which is usually costly.

¹³⁵ DBH 00061 Resident Trust v Manson Developments Limited, 15.

¹³⁶ DBH 00026 Putman v Jenmark Homes Limited & Ors, 16.

¹³⁷ DBH 00134 Kelleway v Insar & Ors, 80.

¹³⁸ Bill Irvine, “Solid Plaster – Have We Forgotten How To Do It?” *Build* (February 1995): 10.

Designers can come under pressure to dispense with flashings and use sealants in their place but this practice is fraught with risk.

Remember, solid plaster has proven to be a reliable cladding and good standards of performance can be achieved if good practices are followed. On the other hand, short-cutting or ignorance only leads to failure and disappointment.

While in my opinion the article should put a reader on notice that more care should be taken with this type of construction, it emphasises the aesthetic impacts as well as the risk of water penetration, and it is not specific about the consequences of failure. It does not say that water penetrating monolithic-clad buildings without a cavity can cause major rotting in situations where the framing timber is untreated. Nor does it highlight that the risks are much greater where the design of a building is complex, the building has no eaves, and in locations where there are likely to be adverse weather conditions, all factors subsequently revealed through experience and reflected in the BIA's risk matrix.

Territorial Authorities

If builders and developers did not have the knowledge themselves, to what extent could they rely on signals provided by territorial authorities, through their inspection regimes, on what they saw as risk factors? The adjudications certainly made it clear that inspection bodies had a positive obligation to ensure that they were aware of factors that might affect the performance of buildings and reflect this in their inspection regimes in a manner that was reasonable and prudent:

I am driven to conclude that the failure by the Council(s) to conduct inspections of the stucco plaster work and weatherproofing of the exterior joinery before the work was completed, was born of a woeful, but avoidable lack of knowledge by the Council's building officers brought about by the failure of the Council to gather and provide such information as was necessary to enable the Council officers to effectively carry out its duties under the building Act, and that failure was in breach of its Statutory obligations.¹³⁹

¹³⁹ DBH 00134 *Kelleway v Insar & Ors*, 81.

The statutory obligation that is being referred to is contained in s.26 of the Building Act 1991: ‘Every Territorial Authority shall gather such information, and undertake or commission such research, as is necessary, to carry out effectively its functions under the Act.’ To underscore the deficiencies of the relevant territorial authority in this regard, reference was made by the Adjudicator to the *Build* article, the implication being that knowledge was available if the territorial authorities had bothered to look for it.

However, as noted above, territorial authorities did not have an absolute duty of care. They had to be prudent and exercise judgment that reflected the risk of failure and magnitude of the consequences. In regulatory parlance they were expected to take a risk-based approach to the exercise of their functions. For example, a duty of care did not extend to the territorial authority being a clerk of works, or to identifying defects within the building works which are unable to be picked up during a visual inspection or cannot be detected without a testing programme being undertaken.¹⁴⁰ That being said, the adjudications make clear that the territorial authorities: ‘. . . are not rubber stamps. It is their job to carry out the inspection in such a way to ensure that important components are properly built.’¹⁴¹ They were entitled to take into account the known competence of tradesmen: ‘. . . but there must be checks to ensure that the tradesman is maintaining standards and quality control.’¹⁴²

In effect, the adjudications communicated a clear message that territorial authorities had an obligation to be aware of risks of non-compliance with the performance requirements of the building code both generally and in relation to specific buildings, and that the level of diligence that they exercised in relation to inspections was not bounded by ‘cost, policy, or legislation’,¹⁴³ but only limited by what they could reasonably observe. This is consistent with the position taken by the BIA’s counsel in *Body Corporate 200200 v Approved Building Certifiers Ltd*: ‘. . . BIA has a range of policy, quasi-legislative, educational and second level

¹⁴⁰ DBH 00804 *Clarken v Carling & Ors*, 26-27.

¹⁴¹ DBH 00036 *Godinich v Guan Thye Heng Co Ltd & Anor*, 15.

¹⁴² WHRS 00300 *Theobald v Coulter & Ors*, 25.

¹⁴³ DBH 00134 *Kelleway v Insar & Ors*, 73.

regulatory powers but is not the primary regulator of building work. That is left to territorial authorities and building certifiers.¹⁴⁴ (my underlining)

Given an obligation on territorial authorities to be aware and to apply their knowledge in the exercise of their control functions, it might be reasonable to assume that builders and developers, given that they had to make a judgment on these same matters, should be able to rely in part on the information that was being communicated to them, through the inspection process, on the standards of care required to meet the performance requirements of the building code. This, however, assumes that the territorial authorities were in a position to equip themselves with the necessary knowledge. Was this a reasonable expectation?

The answer to the question depends on whether this knowledge existed and was available to the inspection bodies, and whether risk mitigation was best done through the inspection process.

The state of knowledge at the time that decisions were being taken by territorial authorities requires an elaboration and analysis of the chronology of events leading up and including the promulgation by the BIA of the risk matrix. In effect, did the risk matrix codify what was already known or could reasonably be known by territorial authorities over the period that they were consenting and inspecting buildings, or did it reflect a judgment made in light of experience? The adjudications assume that territorial authorities had, or should have had, the necessary knowledge. The chronology can largely be drawn from the High Court case ***Body Corporate 200200 v Approved Building Certifiers Ltd.*** and the appeal against the High Court decision in ***Attorney General v Body Corporate 200200.***

To put this case into context, Body Corporate 200200 claimed that the leaking of the Sacramento development came about as a result of defaults by a number of parties, including the BIA, who was named as the sixth defendant. The basis of the claim against the BIA was negligence under ‘three heads’, two of which go to the state of knowledge. The knowledge-

¹⁴⁴ *Body Corporate 200200 & Anor v Approved Building Certifiers Ltd & Ors* unreported, HC Auckland, CIV 2003 404 512, 2 February 2005, Williams J., para.69.

related ‘heads’ were the way in which the BIA: ‘. . . dealt with faced-fixed monolithic cladding systems (‘cladding systems’) over untreated timber’, and ‘. . . its roles in promulgating and not amending or revoking provisions of the Building Code and an Acceptable Solution known as B2/ASI’.¹⁴⁵ There was also a cross-claim by one of the defendants (EPHL) against the BIA which focused on: ‘. . . an alleged breach of duty by approving untreated timber for use in framing.’¹⁴⁶

Table 1: Chronology of events leading to promulgation of Risk Matrix

Date	Event
During 1990’s	‘increasingly diverse building systems came into common use (including the use of face fixed monolithic cladding) and a number of design practices, building techniques and consumer preferences emerged which are relevant in the present context. These include: flat roof structures, building without eaves, the replacement of flashings with sealants, balconies and decks, and an increasing focus on energy efficiency at the expense of natural ventilation.’ (AGvs200200: para. 27)
From 1995	Monolithic cladding systems causing decay of untreated framing timbers in parts of Canada and the United States.
1995	Standards New Zealand published NZS3602:1995. This standard stated that the E2 (durability) requirements of the building code could be met by ‘kiln-dried untreated radiata pine framing’ so long as it was ‘not exposed to ground atmosphere or in any position where the timber moisture content will exceed 18%.’
February 1995	<i>Build</i> magazine ‘Solid plaster – have we forgotten how to do it?’
1996	Publication by BRANZ of ‘Stucco Good Practice Guide’.
February 1998	The BIA issues Acceptable Solution B2/ASI. This acceptable solution provided as a matter of regulation, rather than at the discretion of a territorial authority, that NZS3602:1995 (untreated timber) was acceptable as meeting the durability requirements of the building code.
April 1998 to August 2000	According to the claim the ‘BIA was repeatedly advised by a firm of building consultants of leaking and excessive moisture under the [monolithic] cladding systems

¹⁴⁵ *Body Corporate 200200 & Anor v Approved Building Certifiers Ltd & Ors* unreported, HC Auckland, CIV 2003 404 512, 2 February 2005, Williams J., para.11.

¹⁴⁶ *Ibid.*: para.66.

	and the serious implications of using these systems over untreated timber.’ (Body Corporate 200200 v Approved Building Certifiers Ltd: para.45)
December 2000	The BIA funded study by UNITEC on pre-purchase inspection reports carried out by Prendos.
2002	Report of the Overview Group on the Weathertightness of Buildings (Hunn Report)
2004	Promulgation by the BIA of Risk Matrix

The implication of the claims by Body Corporate 200200 and EPHL against the BIA is that from 1995 there was information from both Canada and the US that identified problems with the use of monolithic cladding over untreated timber, and from at least 1998 there was information that pointed to a problem in New Zealand. The *Build* article would take the latter information back to 1995.

That being said, the first systematic assessment the performance of claddings was that carried out in December 2000 by UNITEC.¹⁴⁷ This study noted the significant increase in the use of stucco plaster systems and flush-jointed sheet materials during the 1990’s, and identified that these cladding systems were showing evidence of defects leading to moisture penetration. However, according to a press report at the time, even the author was characterising the study as providing data rather than analysis: ‘. . . as Chris Murphy of Unitec pointed out, the survey was a survey, it was not research, no conclusions were reached.’¹⁴⁸

The other indicators of the state of knowledge at the time were the technical decisions that were ultimately taken to manage the risks. Foremost amongst these were the following:

1. A requirement that timber used in framing which may come into contact with water must be treated;
2. A requirement that there must be a cavity behind monolithic cladding;
3. A risk matrix that imposed more stringent design requirements for buildings defined as ‘high risk’ by the risk matrix.

¹⁴⁷ Colin Murphy, “Cladding defects study.” *Build* (September/October 2001).

¹⁴⁸ Butterpaper. “Leak Peak Not Freak.” Butterpaper News Archive 2002: 10, (October/November 2002).

It is now possible to draw some conclusions on the state of knowledge at the time that builders were building and inspection bodies were inspecting. We know from the determinations and adjudications that the combination of manufacturers' specifications and industry best-practice guides provided clear direction on how buildings should be built if they were to prevent water ingress. We know from the specification of NZS3602: 1995 that kiln-dried (untreated) radiata pine framing was considered suitable for framing, so long as it was not located in a position where the timber moisture content could exceed 18%. We also know from the 1995 *Build* article that there was an awareness that some monolithic-clad buildings were at risk of leaking because of poor quality construction by builders, and that at least the BIA was receiving information that linked this efficacy of this form of construction to the durability of the framing material.

It is equally clear from the evidence that continuing into the early 2000s there was a lack of appreciation of both the incidence and significance of the risks associated with a combination of building technologies that included Mediterranean-style houses (with various features such as a lack of eaves and the replacement of flashings with sealants), monolithic cladding and untreated timber. There was also both a lack of knowledge and indeed conflicting ideas on what would need to be done technically to address the risks until about 2002. Importantly, these risk-mitigation measures focused on required changes to the building technologies rather than the quality of construction and associated inspection regime. While it is important not to understate the significance of construction quality, the regulatory response explicitly acknowledged that buildings are always at risk of leaking (more so for high-risk designs in high-risk situations) and hence the building technologies need to be robust enough to cope with this.

A distinction between liability and responsibility

The court cases provide a richer, albeit incomplete, picture of the building control regime as it was applied, and should have been applied, by more clearly distinguishing between liability and what could reasonably be expected of different participants in the regulatory regime.

The first of these participants are territorial authorities, as the regulatory bodies that approve building designs and, in the course of doing so, building technologies. Territorial authorities must be satisfied ‘on reasonable grounds’ that the building design they consent will meet the performance requirements in the building code. They must accept acceptable solutions as demonstrating compliance with specific code provisions, but need to themselves assess alternative solutions against the code. Territorial authorities can also rely on products or systems that have been accredited by the BIA, and seek determinations from the BIA in cases of doubt or dispute. It is also reasonable for a territorial authority to draw on expert advice in making its decision.

The importance of decision-making by the territorial authorities is highlighted in *Body Corporate 200200 v Approved Building Certifiers Ltd* by reference to the building code, which is: ‘. . . necessarily at a fairly high level of abstraction to enable it to apply universally.’¹⁴⁹ Given the obligation on territorial authorities to be reasonably satisfied that a building will comply with the building code, the clear implication is that territorial authorities are required to interpret the code provisions in the context of the particular building technologies that have been proposed and the location in which the building will be built. Indeed, this was the position taken by the Counsel for the BIA in *Body Corporate 200200 v Approved Building Certifiers Ltd*: ‘As counsel made clear, it is arguable that the Code in its present form was adequate to cover what occurred at Sacramento and that the installation of cladding systems over untreated timber with inadequate ventilation was in breach of a number of Code provisions’,¹⁵⁰ and in the summing up by the judges: ‘. . . it is important to bear in mind that B2/ASI said nothing about the use of the cladding systems. In incorporating NZS3602: 1995 as an Acceptable Solution it was simply saying that untreated timber framing could meet the Code durability requirements if used in accordance with certain conditions.’¹⁵¹

¹⁴⁹ *Body Corporate 200200 & Anor v Approved Building Certifiers Ltd & Ors* unreported, HC Auckland, CIV 2003 404 512, 2 February 2005, Williams J., para.154.

¹⁵⁰ *Body Corporate 200200 & Anor v Approved Building Certifiers Ltd & Ors* unreported, HC Auckland, CIV 2003 404 512, 2 February 2005, Williams J., para.157.

¹⁵¹ *Ibid.*, para.166.

Given the potentially wide diversity of new and innovative building technologies and range of situations, this was indeed a challenging task for the territorial authorities to perform.

In this environment of devolved decision-making what was the role of the BIA as the central regulatory authority? The BIA had certain statutory functions that were set out in Section 12 of the Building Act 1991:

- a. After consultation with appropriate persons and organisations, advising the Minister on matters relating to building control;
- b. Approving documents for use in establishing compliance with the provisions of the building code;
- c. Determining matters of doubt or dispute in relation to building control;
- d. Undertaking reviews of the operation of territorial authorities and building certifiers in relation to their functions under the Act;
- e. Approving building certifiers;
- f. Granting accreditation of building products and providers;
- g. Disseminating information and providing educational programmes on matters relating to building control;
- h. Generally taking all such steps as may be necessary or desirable to achieve the purposes of the Act.

However, it is clear that beyond the development of the building code the BIA interpreted its role as an oversight body and source of information and advice narrowly, and even within that narrow interpretation felt constrained in the level of activity that it undertook. Three reasons for this were put forward in the court cases. The first was that, as discussed above, the BIA took the position that it was the responsibility of the territorial authorities and building certifiers to administer the building code not the BIA – effectively the BIA was claiming that it did not have a mandate. The second was that the BIA claimed that it did not have the capability to administer the building code: ‘While BIA is pleaded to have received a wealth of material criticising use of the cladding systems over untreated timber, it could not know all uses to which the Code was being put and by whom, and had no means of policing

infractions.’¹⁵² The third is that it did not have the resources. Noting that Ministers capped expenditure by the BIA, Dr Porteous, Chief Executive from 1998-2003, was reported in *Body Corporate 200200 v Approved Building Certifiers Ltd* to have made the point that: ‘Though BIA proposes broad objectives to Ministers and more detailed focus areas, Ministerial limitations on funding necessitates selection and, even in the running of projects selected, partial achievement is often only possible.’¹⁵³

It is also clear that the BIA’s interpretation of its role did not coincide with the expectations of other stakeholders in relation to both the BIA’s general role in monitoring the regulatory regime and warning of risks, and in providing technical input that the industry could rely upon. This lack of alignment is likely to have created a moral hazard problem at two levels. At the first level the lack of action by the BIA to warn may have led the industry to conclude that the building technologies that were being used, and how they were being used, were acceptable. At the second level, the steps the BIA did take to approve specific building technologies (untreated timber) may have resulted in less scrutiny of the particular circumstances in which they would be used.

This latter manifestation of a moral hazard problem was discussed by the judges in *Body Corporate 200200 v Approved Building Certifiers Ltd*: ‘Although they [Acceptable Solutions] are not the only means of establishing compliance with particular provisions of the Code, no doubt, having the imprimatur of BIA, they have an attractiveness to those proposing to be involved in building in establishing Code compliance by contrast with other means of achieving the same objective Therefore, if Acceptable Solutions are negligently approved or not amended, it must have been foreseeable to BIA that persons would utilise them to

¹⁵² *Body Corporate 200200 & Anor v Approved Building Certifiers Ltd & Ors* unreported, HC Auckland, CIV 2003 404 512, 2 February 2005, Williams J., para.158.

¹⁵³ *Ibid.*, para. 40.

achieve Code compliance and would rely on them and so might suffer through its negligence.¹⁵⁴

The BIA's interpretation of its role also gives rise to the question: if the central regulator was not monitoring the regulatory regime as a whole and the risks therein, who was? In *Attorney General v Body Corporate 200200*, the Appeal Court ultimately determined that the BIA did not have a duty of care in relation to monitoring, investigating and advising, but this was the legal position, not what might be a reasonable expectation of the BIA, as the Court makes clear:

In the late 1990s, the BIA could have foreseen that adoption by the building industry of defective building systems had the potential to cause substantial economic loss. Further, it would have been open to the BIA (in the sense of being within its functions as provided for by s 12) to investigate practices within the building industry, and to take steps which would have been effective to put an end to (or at least limit) practices which were producing outcomes that did not conform to the building code. It could have achieved this in various ways, either by use of its specific statutory powers (for instance by promoting an amendment the building code, under its s 17 jurisdiction to determine disputes or perhaps by way of review of the operation of building certifiers) or alternatively by disseminating information under its general s 12(g) power.¹⁵⁵

Further, if there was a duty of care, it is at least arguable (on the basis of what we have seen) that the BIA was negligent. Similar widespread leaky building problems occurred in North America in the 1990s. As well, some in the New Zealand building industry were, by the late 1990s, predicting (accurately as it turned out) that the then current building techniques and systems would result in widespread building failure. It may well be that the BIA could and should have acted more promptly on these concerns.¹⁵⁶

¹⁵⁴ *Body Corporate 200200 & Anor v Approved Building Certifiers Ltd & Ors* unreported, HC Auckland, CIV 2003 404 512, 2 February 2005, Williams J., para.168.

¹⁵⁵ *Attorney-General v Body Corporate No 200200* [2007] 1 NZLR 95, para. 58.

¹⁵⁶ *Ibid.*: para. 59.

Interim conclusions based on first two iterations

Figure 6 illustrates the combination of factors that I have been identified in this second iteration that are associated with the failure of dwellings.

Figure 6: A more complex picture of why buildings failed

Given this combination of factors it is now possible to draw some firm conclusions. My starting point is an assumption that there is, legitimately, a significant variation in performance across the building sector, reflecting regulatory and value-for-money criteria. While the building code sets the minimum requirements, producers could deliver to higher standards and consumers could demand (and pay for) higher standards.

Conduct standards applying to builders/developers made it clear that they had a duty of care to take reasonable steps to ensure that houses were built in accordance with the building code. A duty of care involves a judgment on what was a 'reasonable' level of workmanship in relation to a particular building technology, having regard to the performance requirements of the building code. For monolithic-clad buildings this judgment should have involved a calculation of the likelihood of water penetrating, and the consequences of water penetrating. From the early 1990s when this particular building technology started to become popular, until about 2002, builders/developers did not have the information required to complete this calculation. To be clear on this point, while there was evidence from 1995 that monolithic-clad buildings needed to be very carefully constructed to minimise the risk of leaking, the full consequences of buildings that did leak was not known until early 2002.

The effect of this is that builders/developers were building (or permitting to be built in the case of developers) buildings to a standard of workmanship that was not commensurate with the actual risks associated with the building technology.

Likewise, territorial authorities were required to exercise reasonable care not to allow houses to be built in breach of the building consent and building code. The standard of care was a prudential one, and therefore had to take into account 'the degree and magnitude of the consequences' of defects by builders/developers. As with builders/developers, the information required by inspection bodies to make this assessment was not known until 2002.

It could be and in fact was argued that, as front-line regulators, territorial authorities had an obligation to generate this knowledge because it was necessary for them to effectively carry out their statutory functions. However, territorial authorities had an expectation that the BIA would take steps to both know and then inform the industry of risks with particular building technologies. The fact of the BIA not doing this in a timely manner both by omission (not warning) and commission (approving untreated framing timber as an acceptable solution) created a moral hazard problem. Territorial authorities were not sensitised to the risks of monolithic-clad buildings because what they saw as an authoritative source of information did

not signal that there was a risk. However, the Appeal Court made clear while this may have been a reasonable expectation of the BIA, it did not have a corresponding duty of care.

Based on these conclusions it is possible to describe the key features of the regulatory landscape in the 1990s and early 2000s that contributed to the leaky building crisis:

1. New and innovative and, in a New Zealand environment, largely untested building technologies were permitted on to the market.
2. Responsibility for making risk-based judgements on the compliance of buildings utilising these building technologies was devolved, formally or by default, to participants who did not have the knowledge to make these judgments, namely builders/developers, territorial authorities and building certifiers.
3. Arguably a risk-based framework underpinned by a requirement to exercise caution with novel building technologies in critical building areas could have addressed this lack of knowledge. The fact that buildings continued to be built notwithstanding information progressively becoming available on the performance of the building technologies suggest that a permissive rather than a precautionary¹⁵⁷ approach was taken.

Third iteration: the two reviews

Introduction

The first two iterations focussed on the behaviours of builders/developers, the front-line regulators and the BIA. Other participants in the regulatory regime, including owners, designers, manufacturers and experts (product/system appraisers and professional bodies) were not given as much attention. The next iteration sheds light on these participants, as well as tests the three features of the regulatory landscape identified on page 100.

¹⁵⁷ I am using the dictionary definition of ‘precaution’: ‘a measure taken in advance to prevent something undesirable happening’ (Concise Oxford English Dictionary, 11th Edition, Revised), rather as a reference to the Precautionary Principle.

Background to reviews

The BIA set up the first of the two reviews of the leaky building problem in February 2002. The terms of reference of the Hunn Committee included identifying:¹⁵⁸

1. 'The nature, extent and effect of the current failure of some buildings to deal with moisture in and through their exterior envelops';
2. 'Potential contributing causes';
3. 'Whether the failures are attributable to deficiencies in the Building Act, the Building Regulations, or the manner in which these are administered by the Authority or by Territorial Authorities (including the role of Building Certifiers)'.

The Hunn Committee provided an initial report to the BIA in August 2002, and the final part, which deal specifically with the third question in the terms of reference, in October 2002.

The second review was a formal inquiry by the Government Administration Select Committee into the weathertightness of buildings in New Zealand. The Committee called for submissions and heard evidence, and reported to the House of Representatives in March 2003.

The scope of the two reviews overlapped, but as the Select Committee followed the review by the Hunn Committee it was able to take into account new information stimulated by the release of the latter Committee's report. The reviews were both diagnostic and orientated to identifying solutions to the problems that were identified. The diagnostic elements are of particular interest to the question that this chapter address, namely what factors contributed to dwellings failing to perform as expected.

My first two iterations identified a problem with the quality of information available to participants in the regulatory regime which led them to make sub-optimum decisions, having

¹⁵⁸ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 1.

regard to the objectives of the building control regime. Specifically, this was information on the likely performance of innovative technologies at the time they were put on the market, and information on their actual performance *in situ*. In addition to factual information there was also a lack of evaluative information, being information that would permit risk-based judgments to be made.

The other key issue that emerged in the first two iterations is that decision-making on the extent to which innovative technologies complied with the performance requirements of the code was devolved to participants in the regime least likely to have the capability to make these judgments, except on the basis of information provided by others who were better informed, or should have been better informed. While builders/developers and frontline regulators had a role to ensure that buildings complied with the building code, they assumed the full responsibility by default, as other participants in the regime did not seem to think that they had a role, or perhaps more accurately, they did not see themselves as accountable for ensuring that information was created and communicated. The behaviours of these other participants are explored in this iteration.

Building sciences

A useful place to start with a discussion on the quality of information on the performance of innovative technologies is a definition of building science:

The study of interactions between the environment, occupants and allied building materials, components, and sub-systems, performed with a view to achieving predictable performance of the building system.¹⁵⁹

Based on the previous iterations there is a *prima facie* case for arguing that the failure of monolithic-clad buildings resulted from: (i) a failure within the regulatory regime to predict how they would perform given the combination of technologies that were used (complex

¹⁵⁹ Definition taken from National Institute of Building Sciences: http://www.nibs.org/nabs.html#_ftn1 (accessed May 12, 2009).

designs, untreated timber, lack of cavities) and in the situation in which they were used (climate, capability of building sector), and (ii) a failure within the regulatory regime to develop and apply a methodology that would have enabled risk-based judgments to be made in situations where the science was not definitive. It can also be argued that there was also a problem with timeliness, in so far as when the knowledge did start to emerge it was not assimilated and reflected in the building science relating to the relevant technologies. The formal reviews of the weathertightness problem and the statutory framework provided by the Building Act 1991 confirmed these conclusions.

A lack of science

The reviews identified two issues in relation to science: what was known and, given the state of knowledge, what was decided. This comes through in the discussion in the Hunn Report on the comparable Canadian and US situations. Unable to find a way of addressing the weathertightness of buildings the authorities in Vancouver put in place a moratorium on the use of EIFS (a form of monolithic cladding) in January 1996. This moratorium was followed by a period of research and the issuing by the Canadian Wood Council of the *Best Practice Guide for Wood-frame Envelops in the Coastal Climate of British Columbia* in 1999.¹⁶⁰ In North Carolina, having regard to the fact that there was a: ‘Multitude of opinions [and the] science is still evolving and there is a lack of good research’, the North Carolina Building Code Council adopted guidelines that: ‘. . . effectively put an end to the use of foam-based barrier EIF systems’, by requiring a 20-year warranty on such systems.¹⁶¹

New Zealand took a different approach. While the BIA had information on the Canadian situation, and representations from some industry participants that there was a problem in New Zealand, in the mid to late 1990s, it effectively permitted the technology to continue to be used and focused on developing a more empirical understanding of the nature and significance of

¹⁶⁰ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 10.

¹⁶¹ *Ibid.*, 11

the problem, rather than taking the precautionary approach evidenced in Canada and the United States.

What was the state of the building sciences in New Zealand in relation to weathertightness? Beyond the overseas experience and evidence emerging that monolithic-clad buildings in New Zealand were leaking, there was in fact little scientific information that would enable the performance of buildings to be predicted, and such information that existed was often contested. Specifically:

1. There was a lack of scientific understanding of how different elements of a building - particular building designs, claddings systems, different types of timber treatment, the use of sealants and paints, interfaced and performed.¹⁶²
2. There were strong disagreements between industry participants over the contribution that the shift from boron-treated timber to kiln-dried (untreated) timber made to the weathertightness problem.¹⁶³
3. There was also little scientific information on the consequences of leaking buildings. While there was some evidence that water damaged timber led to toxic fungal growths: 'The extent, nature and consequences of the issue is not known nor what might be appropriate mitigation and protection measures. Research is required to learn more of the phenomenon'.¹⁶⁴

The Hunn Report sums up the state of knowledge of the building sciences in New Zealand as follows: 'Generally, basic research into issues of weathertightness in New Zealand building is sparse. BRANZ records a low level of weathertightness building science in the last 20

¹⁶² Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), see 9/10 and 30/31;

¹⁶³ Government Administration Select Committee, *Inquiry into the Weathertightness of Buildings in New Zealand* (Wellington: New Zealand, March 2003), 18-21.

¹⁶⁴ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 13.

years.’¹⁶⁵ There was some evidence of a resurging interest in such research with the establishment of a cross-industry body, the Weathertight Buildings Steering Group (WBSG) in 2001, and discrete research programmes being carried out by BRANZ and the Forest Research Institute,¹⁶⁶ but the largely formative nature of these programmes highlights the paucity of science at the time that it was needed.

A lack of risk-based judgments

The preceding discussion looked at the state of the building sciences in relation to weathertightness and the different approaches that can be taken when the science is incomplete. It contrasts the Canadian and US approaches, which were proactive and precautionary, combined at least in Canada with an investment in improving the state of knowledge, with the New Zealand approach which was reactive and permissive, with the little emphasis on improving the science. The state of scientific knowledge is, however, only one of the factors that need to inform risk-based decisions on whether to permit or prohibit (or further investigate) an innovative new technology. The other is the consequences of making the wrong decision (including the decision to do nothing).

It can be assumed that an understanding of the consequences informed the British Columbian and North Carolinian decisions. It seems quite clear that in a New Zealand context the consequences were not factored into decision-making. In the first instance this was because decision-makers did not have the information required to assess the consequences. There was a lack of empirical information on the nature and extent of the problem (how many buildings were affected and the extent of damage),¹⁶⁷ and there was a lack of science that would inform decision-makers of some specific costs, such the health implications of toxic fungal growths. As important, however, there appeared to be a lack of appreciation of the ‘value’ of homes to

¹⁶⁵ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 29.

¹⁶⁶ *Ibid.*: 29-30.

¹⁶⁷ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 12.

owners and occupiers (and hence an appreciation of the consequences of a failure of buildings). This includes the financial value, as the homeowner's typically largest investment, but also intangible values. This is reflected the following quote from the Hunn Report:

Balancing the concept of flexibility and freedom of choice should be recognition of the basic human need for shelter and protection from the elements. As the Overview Group and others have stressed, a citizen's home may be his or her castle but it is much more than that not least being the community's guarantee of an orderly and productive society. Housing is not just another commodity. It has a special call on the Government's attention and the regulatory framework must reflect this - it cannot be left to market forces alone, as influential as they will continue to be.¹⁶⁸ (my underlining)

This normative view of the broader 'value' of homes also came through the submissions to the Select Committee Inquiry (indeed led to its establishment), and were summed up by the Committee as follows: 'Some of these people presented their stories to us which provided the committee with an insight into the difficulties individuals have faced as a result of owning and living in a leaking, and sometimes, rotting home.'¹⁶⁹

This emphasis on what the community and individual homeowners and occupiers valued contrasted with the norms that were seen to underpin the Building Act 1991 and its implementation. The Hunn Report notes in particular the reliance on light-handed regulation, market forces and self-regulation to provide an assurance of quality to consumers, with the law limited to safeguards to meet defined objectives associated with health and safety, loss of amenity and access for people with disabilities.¹⁷⁰ A sense of community value did not appear to underpin the rationale for state regulation of home construction. Therefore a calculation of the full consequences of failure could not be undertaken, not just because of a lack of science

¹⁶⁸ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority – Addendum: Section 3* (Wellington, New Zealand: October 31, 2002), 9.

¹⁶⁹ Government Administration Select Committee, *Inquiry into the Weathertightness of Buildings in New Zealand* (Wellington: New Zealand, March 2003), 12.

¹⁷⁰ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority – Addendum: Section 3* (Wellington, New Zealand: October 31, 2002), 9-11.

and an understanding of the scale of the problem, but also because the consequences were in part a function of the community values embodied in housing, and these either were not known or not recognised as a legitimate expectation of the state in regulating housing design and construction.

Who contributed what to the failure

The two reviews identified that the behaviours of a wide range of participants contributed to the leaky building crisis. They did not single out one or a sub-set of these participants as being particularly responsible. In fact they were clear that the weathertightness problem resulted from a ‘systemic failure’.¹⁷¹ In doing so, the Hunn Committee in particular confirmed one of the key conclusions arising out of the first two iterations, that notwithstanding the legal position, frontline regulators could not be expected to shoulder the regulatory burden:

The practical effect of the current system when it comes to the crunch of litigation (and as we have said that is where the battle over weathertightness tends to be fought) is to dump most of the responsibility on the building inspector. It should be apparent from what we have said that this is not a true reflection of the building process. While we have found that this part of the process requires significant improvement, the number of parties required to arrive at the end product should be mirrored in the system of ‘responsibility, accountability and public liability.’¹⁷²

While the Hunn Committee is foreshadowing a policy outcome, it is possible from a diagnostic perspective to associate each of the contributing behaviours with one or more of the weakness of the regulatory regime that have emerged so far. Illustrated in Table 2 are a set of behaviours that can be attributed to a lack of knowledge, another set of behaviours that contributed to there being a lack of knowledge, and a further set of behaviours that can be

¹⁷¹ Government Administration Select Committee, *Inquiry into the Weathertightness of Buildings in New Zealand* (Wellington: New Zealand, March 2003), 15; BIA Overview Group on Weathertightness of Buildings: Public Statement. 20 May 2002, 4.

¹⁷² Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 41.

associated with a lack of a risk-based framework for taking decisions, including an appreciation of ‘community value’. In a number of cases behaviours can be associated with more than one factor.

By way of example, poor choices by homeowners in demanding homes of a style that had inherent risks might be attributed to a lack of knowledge.¹⁷³ But manufacturers of monolithic-clad building systems contributed to a lack of knowledge by holding out that their product met the requirements of the building code, thus providing confidence to builders and developers that they could safely use this product. Expert bodies, specifically those who assessed products against the requirements of the building code, contributed to a lack of knowledge as these assessments were relied on by regulators and others, but the assessment process they followed, which focused on: ‘. . . a specific product or element rather than a system’,¹⁷⁴ can be attributed to the lack of a risk-based framework for making such assessments having regard to the objectives of the Building Act.

Table 2: Behaviours contributing to building failures

Actor	Behaviour	A	B	C
Owners	Prospective owners demanding particular building styles and designs without appreciating the risks associated with them in certain conditions.	X		
Product manufacturers	Product manufacturers emphasising product features rather than the building system as a whole.		X	
Builders	Builders/installers not giving sufficient attention to the quality of workmanship required to achieve weathertightness. This can also be attributed to the level of trade skills.	X		
Developers	Developers offering particular building styles and designs without	X		

¹⁷³ After the problems with monolithic-clad buildings became well known they attracted a stigma which was reflected in the market price – see Song Shi, “An Analysis of Leaky Home Stigma Impacts on Residential Property Values,” (a Research Report presented in Partial Fulfilment of the Requirement for the Master of Business Studies at Massey University, 2003).

¹⁷⁴ Overview Group, Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority (Wellington, New Zealand: August 31, 2002), 27.

	appreciating the risks associated with them in certain conditions + Developers not ensuring structures and systems are in place to provide effective 'whole of building' quality control, and putting emphasis on cost/speed rather than quality.			
Designers	Designers not giving sufficient attention to the quality of workmanship required to achieve weathertightness + Designers not providing adequate detail in drawings and specifications that accompany consent applications.	X	X	
TAs as Consent Authorities	Consent authorities accepting product appraisals provided by BRANZ without question as the basis of being 'satisfied on reasonable grounds' that the overall building design meets the performance requirements of the building code. This can also be attributed to a lack of resources to undertake a fuller investigation, and in-house legal advice that an appraisal should be sufficient grounds.	X	X	X
TAs as Inspection bodies	Inspection bodies not giving sufficient attention to the quality of workmanship required to achieve weathertightness. This can also be attributed to the level of inspection skills.	X	X	
Educational institutions	Educational institutions (architecture, trades), not giving sufficient attention to the risks and challenges posed by new technologies, and how they should be managed in the design and construction process: 'Design studio projects in Schools of Architecture rarely require the presentation of design details that even indicate the buildability of a project far less its weathertightness. Assessment criteria in design projects rarely place emphasis on buildability and weathertightness.' (Hunn, August 31, 2002:38)	X	X	X
BIA	The BIA issuing approved documents where 'The focus is on the performance of individual products rather than their role in the overall building system, or more particularly in the case of weathertightness, their role and function in the building envelope or building facade.' (Hunn, August 31, 2002:19)		X	X
Expert bodies	BRANZ issuing product appraisals that often relate to 'a specific product or element rather than a system'. (Hunn, August 31, 2002:27). Experts providing producer statements that also focused on specific elements.		X	X
Research bodies	Research bodies not giving priority to developing research programmes that reflect emerging issues in relation to the performance of buildings.		X	
Government agencies	Research commissioning bodies (those bodies that might be expected to monitor and highlight emerging risks having regard to agency or statutory objectives, such as the BIA and the Ministry of Health) not identifying		X	X

	weathertightness as an issue and initiating research.			
Industry & Professional Bodies	Industry and professional bodies not monitoring and highlighting emerging issues.		X	X
Standards bodies	The standards development process focusing on individual products rather than their role in the overall building system having regard to the full range of objectives for buildings.		X	X

- A. Behaviours that can be attributed to not having knowledge.
- B. Behaviours that contributed to there being a lack of knowledge.
- C. Behaviours that can be associated with a lack of risk-based framework for taking decisions, including an appreciation of ‘community value’.

Conclusion

The exercise of judgment is a basic human faculty and required on a day-to-day basis as we go about our everyday lives, including on such matters as the level of care that should go into the construction of a building and the approval of designs and construction. Within a legal framework this is reflected in the requirement to take ‘reasonable care’.

For many builders ‘reasonable care’ entails meeting minimum standards of construction required to comply with the law, while at the same time being competitive and thus protecting their livelihood. For many building inspectors it involves a judgment that the law is being complied with, having regard to the knowledge that they have and the resources available to them. In neither case is perfection required, unless this would be deemed reasonable in the circumstances. The construction and inspection of a high performance engine may require perfection because the risks of not being perfect would be well known, but no one would expect the same level of care being applied to a garden shed.

The first conclusion I have reached based on this forensic analysis of the leaky building crisis is that monolithic-clad buildings were ‘high performance’ and thus required perfection in their construction, but this was not known at the time that they were being designed and built.

Therefore, builders were taking what they considered to be reasonable care in the circumstances but this was a lower standard than was actually required. Building inspectors also applied a lower standard of inspection than required, because they were not aware of the standard of workmanship required. Both groups exercised what they considered to be an appropriate judgment but they did not have all of the information required to exercise good judgment.

The information that they required was scientific and related to the performance of the building technology in the particular circumstances of its use, and for this to be translated into: (i) a risk-assessment they could apply on a case-by-case basis, and (ii) risk-management advice, including advice on the standard of construction and inspection required. This information was not available through the accumulation of knowledge over time as this was a new technology, nor was it produced at the time the technology was introduced. It was not for some years that it was recognised that there was a need for this information.

This leads to my second conclusion. No one took responsibility for producing either the scientific information or risk information, notwithstanding the fact this was a new and unproven technology. Indeed, there were two new technologies that interfaced; untreated timber and the monolithic-clad building system. There were in fact three questions that needed to be asked: (i) what do we need to know about the performance of these technologies in the possible circumstances of their use (ii) in light of the scientific information what are critical risk factors and consequences of the technologies failing having regard to the objectives of the law, and (iii) what steps would need to be taken to mitigate or manage these risks. None of these questions were asked until well after the technologies were in common use.

The production of scientific and risk information, and the subsequent judgment on the mitigation or management of risk may have led to alternative responses. One could be to ensure that designers, builders and territorial authorities were better informed and hence better placed to know and apply 'reasonable' standards of care. Another could be to impose conditions on the use of technologies or the circumstances of their use to reduce the risks (this

was the approach ultimately adopted in New Zealand) A further response could be to conclude that not enough was known to take the risk of these technologies, and an effective ban put in place while additional science is undertaken. This was the approach taken in British Columbia and North Carolina. The main point is that better information can reveal and inform a broader range of choices. While the introduction to this section implied that better informed builders and inspectors would have enabled them to make better decisions, this may not in fact have either been workable as the risks of this particular combination of technologies could not, in any reasonable circumstances, have been alleviated through better workmanship.

My final conclusion is that the regulatory regime did not fail because of weaknesses in the building sciences and risk assessment. It failed because there was not early detection that there might be a problem and a timely and appropriate response to relevant information that did become available, which led to a very large number of buildings failing with very significant consequences. However, there was knowledge in the industry that there might be a problem with this technology, and some of this knowledge was entering the public domain for some time before formal action was taken on it. The availability but lack of application of knowledge suggests two things. The first is that the regulatory regime as a whole was either not sensitised to risk, or it took a permissive rather than precautionary approach. The Hunn Committee alluded to this when it implied that the regime embodied values associated with choice and cost reduction, rather than those associated with the special place that dwellings have in the fabric of society. Secondly, it suggests weaknesses in the accountability arrangements within the regime, which came through strongly in the court cases in particular, where the defendants to the actions made competing claims as to who was and who was not responsible.

Drawing on the full analysis in this chapter it is now possible to deduce four key weaknesses in the building control regime that existing in the 1990s and early 2002s and which resulted in the leaky building crisis. The first three relate to the building sciences, with its focus on studying interactions to achieve a predictable performance of the building system, having

regard to what the community values in buildings. The last relates to the accountabilities for building performance that were in evidence at the time, as follows:

1. There was apparently no systematic study of the ‘interactions between the environment, occupants and allied building materials, components, and sub-systems with a view to achieving predictable performance of the building system.’¹⁷⁵
2. There was apparently no formal risk assessment of new building technologies (products and designs), having regard to the state of the building science, information being volunteered by industry participants and overseas experience, the objectives of the Building Act 1991 and the performance requirements in the building code. To the extent that risk-based judgments were made, they were permissive rather than precautionary.
3. There was apparently no effective mechanism for motivating and coordinating the multiple sources of information and expertise in relation to both the science and the risk-assessment to ensure that important knowledge about the performance of new building technologies was revealed in a timely manner.
4. Ultimate responsibility for making risk-based judgements on the compliance of buildings utilising these building technologies was devolved to actors who did not have the knowledge to make these judgments, namely builders/developers, territorial authorities and building certifiers.

The next chapter examines whether these weaknesses can be attributed to the performance-based character of the regime.

¹⁷⁵ Definition of building science – see footnote 157.

Chapter 5 – What role did performance-based regulation play?

Introduction

The purpose of this chapter is to establish whether and to what extent the four weaknesses that were evident in New Zealand's post-1991 building control regime can be attributed to the features of the regime that were inherent in its performance-based character. It will draw on the literature review of sources of regulatory failure, and explore the question from two perspectives.

The first perspective compares the regime as delivered (reflected in the Building Act 1991 and post-enactment implementation) with how it was conceived by the architects of the regime, the Office of the Review of Planning and Building Controls (ORPBC) and the Building Industry Commission (BIC). Comparing the regime as it was designed and delivered with the original concept will inform the answers to the following questions: if the concept had been reflected accurately in the design of the regime (the statute and institutions); and/or, if it had been implemented and administered in a manner consistent with the design, would the weaknesses have emerged?

The second perspective compares the regime with a standards-based regulatory regime. A standard is a *technical document* detailing how something should be designed, manufactured, delivered, conducted, tested, which is in the public domain and is intended for repeated use, and has been developed by an authoritative body. A standards-based regime comprises the institutions that produces standards and the laws that require these to be used. If a performance-based regulatory regime can be characterised as setting goals and allowing choice as to how these goals are achieved, a standards-based regulatory regime is the precise opposite, as it provides no choice but rather prescribes what must be done rather than what must be achieved.

Given that the performance-based Building Act 1991 superseded a standards-based regime, comparing the two regimes should inform our understanding of what fundamentally changed

when the regime changed, the relevance of the change in terms of the weaknesses that emerged, and the extent to which the change was required because of the shift to a performance-based approach. While there have been exceptions, the evidence supports a conclusion that standards-based regulation produces outcomes that have generally met society's basic needs for safety and security, albeit while not achieving other objectives, particularly those associated with innovation and efficiency. Standards-based regulation is therefore a plausible point of reference when seeking to identify aspects of performance-based regulation that, in pursuit of innovation, may create risks to safety and security.

In undertaking this comparative analysis it has been important to keep in mind that performance-based regulation is a regulatory approach that has some novel features, but shares many features with other forms of command and control regulation, including standards-based regulation. Therefore, to what extent could the weaknesses evident in New Zealand's post-1991 building control regime be attributed to sources of failure in command and control regulatory regimes generally, rather than specific to the novel features of performance-based regulation?

Analytical framework

The analytical framework I have adopted has three parts to it. The first part is the weaknesses that emerged from the empirical review of the leaky building crisis, abridged as: weak building sciences, weak risk-analysis, weak feedback loops, and poor devolution. The second part draws on the high level literature review on sources of regulatory failure which attributes failures to either poor design or poor implementation, or because the regulatory regime has not reflected the inherent inability of the state to 'command and control' (a failure of state-centric law). The third part identifies the particular risks associated with performance-based regulatory regimes that have been identified in the literature. This framework is represented in Figure 7.

Figure 7: A framework for comparative analysis

The analytical framework will be used to establish whether there is a correlation between one or more of the weaknesses with one or more of the failure types and one or more of the risks inherent in performance-based regulatory regimes. For example, was there weak risk-analysis because the need for this to be addressed in the design of the regime had not been thought of, or because those responsible for implementation did not carry this out in the manner intended? If it was the latter, could this be attributed to measurement or accountability problems associated with the particular characteristics of performance-based regulation?

From conception to administration

Background

The gestation period for the New Zealand building control regime was close to a decade, from the first discussion document issued by the Office of the Review of Planning and Building Controls (ORPBC) in 1983 to the enactment of the Building Act 1991. This period can, however, be divided into two periods: (i) agreement to a performance-based philosophy, and (ii) detailed design of a performance-based regime. There was a subsequent period which

involves the interpretation of the regime during its implementation and ongoing administration.

The work of the ORPCB resulted in the agreement to the performance philosophy, as noted by the successor to the ORPBC, the Building Industry Commission (BIC), in its 1990 report:

. . . the Commission was persuaded that the concept of a national building code that focused primarily on what was necessary for health, safety and amenity had been well canvassed. The formulation of a code with a performance base, which would bind the Crown, had been decided by Government. Further public submissions on this approach were not required.¹⁷⁶

The BIC undertook the detailed design work. Broadly defined this was based on four goals which were to:

1. Adopt a nationally consistent approach to building controls.
2. Apply only those controls that were necessary to achieve health, safety and amenity objectives (an energy efficiency objective was added at the Select Committee stage).
3. Encourage innovative building products and methods.
4. Create competition in the provision of front-line regulatory functions (the issuing of building consents and undertaking of inspections).

The adoption of a national performance-based building code, which bound the Crown as well as private participants, was seen as a means of the achieving the first three goals, as was the establishment of a central regulatory authority. The provision for private building certifiers was the means of achieving the fourth goal.

How political decision-makers understood and represented the regime at the time can be found in the parliamentary debates on the Building Bill in 1991 and press statements that were put out around this time and immediately following enactment. Bureaucratic decision-makers in

¹⁷⁶ Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 8.

the relevant government departments also provided their perspective, most notably in the *Constructive Guide to the Building Act* (1992). How the regime was understood over time by participants in the regime can be found in the various reviews and court cases that resulted from the leaky building crisis.

The evolution of goals – a fundamental shift or a change of emphasis?

The idea that building controls should be restricted to what was essential to achieve certain outcomes was a consistent theme in the various reports and commentaries on the building reforms, and often reflected in the language of ‘minimum standards’. However, a closer examination of what was actually meant indicates that this term was reinterpreted over time.

From a broad to a narrow scope

There is an anecdote that draws on the performance of buildings in the Northridge, California earthquake of 1994. Many homes and commercial buildings sustained damage that meant they could no longer be lived in or used as places of business, but there was a relatively low loss of life. The seismic engineers celebrated this as a success, as their objective was to protect life and limb. The home owners and business operators saw it as a failure of regulation, as their expectations were that buildings be robust enough to continue to be useable.¹⁷⁷

This anecdote highlights the importance of aligning the goals of the law with the expectations of the community (or changing those expectations). A significant misalignment of objectives can lead to regulatory failure if, in an adverse event, the expectations of the community are fundamentally frustrated because what it expected to be the outcome did not eventuate.

¹⁷⁷ Brian J. Meacham, “Identifying and Regulating for Multiple Levels of Performance,” (paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001), 2.

It was generally agreed that the scope of the building control regime should be limited to health and safety, but what was embraced by those terms changed over time.

The ORPBC had a broad definition of health and safety. It proposed that the performance-based building code would set out: ‘. . . the performance required of buildings of all types in terms of minimum standards of health and safety. Health implies comfort and convenience. Safety implies good construction practice and sound design.’¹⁷⁸ Note the emphasis that was put on comfort and convenience as attributes of healthy buildings. The BIC used the term ‘amenity’ as an objective to reflect something over and above a narrow definition of health, but only in situations where there was a close association with an adverse health effect: ‘User requirements related to amenity can also have a place, because amenity can be closely associated with health. In situations where discomfort, smell, noise or inconvenience are excessive or frequent, they can eventually have adverse mental and physical consequences.’¹⁷⁹

The Building Act 1991 states that the purpose of the Act is to provide for: ‘Necessary controls . . . for ensuring that buildings are safe and sanitary’ and particular regard should be had to the need to ‘safeguard people for possible injury, illness, or loss of amenity’¹⁸⁰. The terms safe and sanitary are not defined, but amenity is defined as meaning: ‘. . . an attribute of a building which contributes to the health, physical independence, and well being of the building’s users but which is not associated with disease or a specific illness.’¹⁸¹

While it could be construed that ‘well being’ is capable of a broad interpretation, the various reviews concluded that a narrow interpretation of the goals of the building control regime was taken. For example, the Hunn Committee identified the purpose of the Building Act as

¹⁷⁸ Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand, May 11, 1984), 99.

¹⁷⁹ Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 41.

¹⁸⁰ Building Act 1991, s.6(2)(a)

¹⁸¹ *Ibid.*: 2

limiting, and as such did not fully take into account: ‘. . . basic human need for shelter and protection from the elements.’¹⁸² The Ministry of Economic Development also noted that values such as amenity may not have been given equal importance as health and safety values, and: ‘It appears these factors may have played a part in causing the weathertightness issue.’¹⁸³

This suggests either a design problem if the purpose of the Building Act limited the scope to pursue broader values of importance to the community, or an interpretation problem. Most likely it is a combination of the two; specifically, the purpose of the Act was constructed in a way that provided for multiple interpretations. It was ultimately interpreted narrowly.

Minimum controls

There was an underlying principle, shared by those who conceived, designed and administered the new building control regime, that the role of the state would be restricted to doing the minimum required to achieve the goals. Defining the role of the state in this way arose out the original problem definition, namely that the existing controls were complex and excessive, and can also be demonstrated by reference to the language that was used, from ORPBC’s reference to ‘minimum standards’, to the Building Act’s ‘necessary controls’. But the term ‘minimum’ was in fact interpreted in three different ways.

Minimum = less detailed prescription

In relation to factors that contributed to the leaky building crisis the Hunn Committee commented on the lack of detail in both technical regulations (acceptable solutions) and alternative solutions:

¹⁸² Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority – Addendum: Section 3* (Wellington, New Zealand: October 31, 2002), 9.

¹⁸³ Ministry of Economic Development, *Discussion Document – Better Regulation of the Building Industry in New Zealand: Discussing the Options* (Wellington, New Zealand, March 2003), 4.

There has also been criticism of some of the detail in E2/ASI [an acceptable solution] This appears to have been widely adopted throughout the building industry as an acceptable minimum standard without proper regard to the other features and factors affecting the result.¹⁸⁴

In the context of problems attributable to leaks, the principal issue raised in relation to the documentation supplied for building consent was that insufficient and inadequate detail is being provided on drawings and in specification that accompany building consent applications.¹⁸⁵

The consequences of this lack of detail were twofold. The first is that the territorial authorities did not have enough information in the consent applications for them to make an adequate assessment of building code compliance. The second is that builders could not work off the plans that were approved by the territorial authorities as they were not in sufficient detail, and thus they had to draw on their own knowledge of good trade practice, and other information such as industry guidelines and manufacturers' specifications.

Was stripping out the detail in acceptable and alternative solutions an intended outcome, or an unintended consequence of a light-handed regulatory philosophy? The ORPBC and BIC provide some clues. The ORPBC stated an objective of the new regime of: ' . . . severely diminishing the prescriptive nature of the controls',¹⁸⁶ and the desirability of: ' . . . leaving it to the market, professional and technical competence, the provision of good technical information, and pride in doing a good job, to achieve the objectives'.¹⁸⁷ The BIC elaborated on the idea that the line should be drawn between what was in the public vs. the private interest:

¹⁸⁴ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 19.

¹⁸⁵ *Ibid.*: 21.

¹⁸⁶ Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand: May 11, 1984), 200.

¹⁸⁷ *Ibid.*

The building requirements to be regulated, and the extent of those requirements, will be limited to those which are considered by Government and its advisors to be essential in the public interest. Individuals may, of course, choose to exceed those requirements, or they may choose to apply available resources to satisfy their own particular requirements in areas that are not regulated.¹⁸⁸

The intention that extraneous features of buildings (those that are not essential to the objectives of the regime) should not be reflected in the required documentation comes through, as does the idea that some detailing should be left to workmanship and non-mandatory technical documents. The result was a regulatory environment that was permissive of limiting the detail required in the documentation that was used for regulatory purposes.

Minimum = least economic cost

Using the language of regulatory impact analysis, a case for regulation is made when the benefits to community of regulating exceed the costs (a net benefit), having calculated all of the direct and indirect costs and benefits. In the context of the building control regime, the judgment is associated with the justification for a control, for example in relation to the earthquake resistance of buildings, and the costs and benefits of different levels of resistance.

There was general agreement there should be some form of cost-benefit calculation, but the weighting given to particular objectives changed over time.

The ORPBC focused on the benefits to the community as well as the broader costs of controls, stating that the purpose of the proposed control agency was: ‘. . . to ensure that existing and proposed controls over building activity can be justified in terms of the balance between benefits to the community and the costs to developers, builders and owners of buildings,

¹⁸⁸ Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 33.

commensurate with a determined level of involuntary risk.’¹⁸⁹ The BIC took a similar approach when it spoke about the need to: ‘. . . satisfy reasonable community expectations’.¹⁹⁰

Community expectations were not, however, cited as an objective by the main speakers during the parliamentary debates on the Building Bill, and hence except by omission they do not provide any insights into what was being measured. The Building Act itself focuses on the mechanism rather than the benchmark: ‘. . . due regard shall be had to the national costs and benefits of any control, including (but not by way of limitation) safety, health, and environmental costs and benefits.’¹⁹¹ Hence, subsequent to the ORPBC and BIC reports, there appeared to be less attention given in public statements to the role of the proposed building control regime in securing broader community goals.

While the ORPBC and the BIC held that the existing regime imposed excessive costs, they also emphasised the need for a balanced framework whereby the costs of controls (both direct and indirect) would be set against the benefits to building owners and producers, users and the community. This emphasis on balance can be contrasted with the emphasis given by the Minister of Internal Affairs, in relation to the purpose of the Bill, namely to: ‘. . . introduce a new, streamlined, and more uniform system of building control in New Zealand’¹⁹² and by the Select Committee that considered the Bill, which stated that the purpose was to: ‘. . . streamline the building industry and to take away the restrictions of so much legislation throughout the country.’¹⁹³

¹⁸⁹ Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand, May 11, 1984), 104.

¹⁹⁰ Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 25.

¹⁹¹ Building Act 1991, S.6 (3)

¹⁹² (1990) 510 NZPD 4320

¹⁹³ (1991) 520 NZPD 5297

This apparent emphasis on efficiency was further reinforced by a document that was prepared when the Building Act was introduced, as reported by the Hunn Committee:

At about the time of the introduction of the Building Act, Department of Internal Affairs senior staff members involved in the drafting of the Act, wrote the ‘Constructive Guide to the Building Act’. The foreword by the Head of the Department at the time, states that an underlying philosophy of the Act is to “minimise compliance costs”. However, it is not clear to the Overview Group what this means as several interpretations can be made. It could relate specifically to the administrative cost of compliance or alternatively to the overall cost of the design and construction compliance with the code requirements. Some territorial authorities and building certifiers hold the view that the certification process is constrained by a desire expressed by the BIA to building officials that any change to the process must avoid putting inflationary pressure on building costs.¹⁹⁴

In this case there does appear to have been a significant shift from the concept to administration. The ORPBC and BIC emphasised the community interest, the need to take into account a broad set of costs and benefits within a risk-based framework, and for the decisions on the need for and nature of controls to be balanced. The Building Act itself contained a requirement for a cost-benefit analysis. However, what was communicated by decision-makers at the time the Building Bill was being considered, and through the implementation and ongoing administration of the new regime, was an efficiency and cost-reduction objective. The community interest objective and the need for a balanced judgment were, by being omitted from the communications, downplayed.

Minimum = a preference for market forces

The BIC argued that: ‘The first criterion is that the regulatory control system must be limited to requirements that are essential to protect the people affected that cannot be assured by

¹⁹⁴ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 8-19.

private arrangements.’¹⁹⁵ The Minister of Internal Affairs, in introducing the Building Bill, stated that: ‘. . . the extent of the regulatory controls will be reduced to essential safeguards if these cannot be achieved through other means.’¹⁹⁶ What do they actually mean?

In the context of implementation the Hunn Committee interpreted this to mean light-handed regulation and a reliance on market forces, and associated this with the failure of the regulatory regime:

The ‘Constructive Guide to the Building Act’... stated: “The Building Industry Commission reported to the Minister of Internal Affairs in January 1990 advising that regulatory interaction should be limited to provisions for safeguarding people’s wellbeing where there are insufficient assurances that voluntary arrangements such as market forces, self-regulation, or self-interest will do the job”. In our opinion the emphasis on self-regulation and light-handed control has led to the BIA having insufficient authority to fulfil its role. As has been said, it “needs teeth and needs to show them occasionally”.¹⁹⁷

This is not, however, what the BIC meant when it spoke of ‘voluntary arrangements’. Rather the Commission was commenting on the inadequacy of voluntary arrangements rather than their desirability when it came to essential health and safety requirements:

The diversity of buildings and the construction process must be taken into account in assessing the likely effectiveness of voluntary arrangements against the merits of regulatory building controls.

Buildings are highly technical and complex artefacts. Untrained people have limited ability and information to assess their likely performance. The ability of technical experts to establish likely performance by inspection after construction is also limited by the fact

¹⁹⁵ Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 34.

¹⁹⁶ (1990) 510 NZPD 4321

¹⁹⁷ Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority – Addendum: Section 3* (Wellington, New Zealand: October 31, 2002), Annex A.

that many components are hidden or inaccessible. The market principle of *caveat emptor* – let the buyer beware – cannot be applied equally to all building users.¹⁹⁸

It is clear from this that the BIC saw building controls as providing a package of measures to ensure that certain minimum standards for building were achieved, not as an alternative to contracting or the market weaning out poor performers. The approach taken in the implementation and administration of the new regime placed much more reliance on market forces than seems to have been envisaged by the BIC.

The evolution of the goals of the building control regime is summarised in Table 3.

Table 3: The evolution of goals

Concept	Delivery
Health & safety, and a broad definition of amenity	Health & safety, and a narrow definition of amenity
Less prescription	Less prescription
Emphasis on meeting community expectations	Emphasis on lowering economic costs
Acceptance that consumers are not equipped to make choices where complex technologies are involved	Heavy reliance on the market

Standards setting and approvals – extending the scope for discretion

Regulatory control was achieved primarily through the building code, technical regulations (acceptable solutions) and an approval process for alternative solutions. One of sources of the failure of the regulatory regime was the lack of acceptable solutions and hence reliance on the alternative solution route. The role of acceptable solutions was another area where there was a shift in approach from concept to administration.

¹⁹⁸ Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 29.

The ORPBC considered acceptable solutions to comprise an integral part of the building code: ‘In discussing the “National Building Code” we mean this to comprise the whole range of building control documents – the Act. . .the performance objectives required – called a code . . . and the all-important codes of practice, means of compliance, technical documents and the like, included, called up or cross-referenced’.¹⁹⁹ The ORPBC also had a broad definition of an acceptable solution, encompassing industry codes of practice, many standard specifications issued by SANZ (the national standards organisation) and technical bulletins and appraisal certificates issued by the Building Research Association.²⁰⁰ Finally, the ORPBC considered these documents to be an inclusive package, in so far as it provided a route by which new means of compliance could be incorporated in the building code, but no other approval mechanism.²⁰¹

The BIC clearly contemplated two routes to achieving compliance with the building code: the first where compliance can be demonstrated through adhering to an approved standard; and the second through demonstrating that a unique or one-off approach meets the performance requirement in the building code, either through an accreditation process administered by the BIA, or through approval by territorial authorities. That being said, the BIC also intended that that there be a comprehensive set of standardised solutions,²⁰² and that the accreditation process provide for the approval of innovative proprietary products, designs or regimes for general use.²⁰³

In relation to the territorial authority-administered approval process, the BIC intended that there be a comprehensive set of checks and balances. This was based on the idea that: ‘In

¹⁹⁹Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand. May 11, 1984), 89.

²⁰⁰ *Ibid.*, 88

²⁰¹ *Ibid.*, 99

²⁰² Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 50.

²⁰³ *Ibid.*, 71.

adopting a performance-based Code which provides for only those essential requirements which must be regulated in the public interest, assurance of compliance is vital.²⁰⁴ While the BIC intended that territorial authorities undertake the initial assessment, either using their own staff, engaging experts, or relying on advice provided by independently qualified people engaged by the building owner,²⁰⁵ there was a key role for the BIA in making decisions in matters where there was a doubt or dispute.²⁰⁶

While the BIC provided for two routes, it can be inferred that the standardisation route was intended to be both the benchmark and the default. In addition to its expectation that there would be a comprehensive suite of standardised documents, the BIC also noted that: ‘Where a proposed technique or system differs from a published acceptable solution, the proposer will have to satisfy the control authority that the performance is not less than that of the Code requirement.’

The implementation of the regime differed from the policy intent in three important areas: (i) a comprehensive suite of standardised documents was not produced²⁰⁷ (ii) the accreditation process was not used as a matter of course, rather product appraisals were relied upon by territorial authorities,²⁰⁸ and (iii) the BIA did not play a key role in determining code compliance where there were matters of doubt.²⁰⁹ Therefore, while in this case the policy

²⁰⁴ Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 72.

²⁰⁵ *Ibid.*, 73.

²⁰⁶ *Ibid.*, 69-70.

²⁰⁷ Ministry of Economic Development, Discussion Document – Better Regulation of the Building Industry in New Zealand: Discussing the Options (Wellington, New Zealand, March 2003), 8.

²⁰⁸ The BIA only ever completed some 11 accreditations in total, but some 26 appraisals were undertaken by BRANZ on cladding systems alone, and these were accepted as a matter of course by territorial authorities and building certifiers (Overview Group, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority* (Wellington, New Zealand: August 31, 2002), 27/28).

²⁰⁹ Ministry of Economic Development, Discussion Document – Better Regulation of the Building Industry in New Zealand: Discussing the Options (Wellington, New Zealand, March 2003), 7-9.

intent seems to have been clear this was not carried through into the implementation and administration of the regulatory regime.

The distinction between the approaches advocated by the ORPBC and BIC, and what was ultimately contained in the Building Act 1991, is illustrated in Figure 8.

Figure 8: Extending the scope for discretion

Responsibilities and accountabilities - reversing the pyramid

Participants in the regulatory regime can be broadly grouped into five categories: (i) consumers, including those who purchase such goods or services, but also others who are affected by the performance of the goods or services (ii) tenants and office workers (iii) producers, who are expected to provide products, designs, systems, and technologies that comply with law (iv) controllers, who set the standards, and monitor and enforce their compliance, and (v) experts, who inform the decisions of the other groups based on specialist knowledge.

Decision-making must be thought of across a number of dimensions: who takes the decision; the basis of the decision; who can be relied upon to inform the decision; and, who is ultimately responsible for the decision. For example, a territorial authority might take the decision to issue a building consent, but the decision must be based on ‘reasonable grounds’ that the building will comply with the building code, and there is an opportunity to seek a ruling from the BIA in situations of doubt or dispute. Therefore the nature of the decision is not ‘yes or

no’, but rather ‘yes, no or seek a ruling’. Territorial authorities can draw on expert opinion in making their decision. The question of responsibility can be thought of as one of legal liability and hence for the law to answer, but there is also a question of the responsibility of public authorities and elected representatives to the community that goes beyond strict liability.

Both the ORPBC and the BIC conceived of a hierarchical structure with an Authority at the top, monitoring the building control regime, determining the extent of the controls and acting as the decision-making of last resort. The ORPBC emphasised the role of an Authority that approved acceptable solutions, delegated administration and enforcement to territorial authorities,²¹⁰ and provided an information service, including interpretations, to the industry.²¹¹ The BIC assigned responsibility for monitoring the overall building control regime and the performance of territorial authorities to the central Authority²¹² and, while it was to be advisory body to the Minister, it was the: ‘. . . decision-making in matters of interpretation, approval and monitoring of the control system.’²¹³

This decision-making role for the central authority was not carried through into the implementation and administration of the new building control regime. For example, in the parliamentary debates on the Building Bill, the Minister of Internal Affairs emphasised the following responsibilities:

- ‘An essential aspect of the Bill is that building owners will be charged with responsibility for building safety and health.’²¹⁴

²¹⁰ Office of the Review of Planning and Building Controls, *Review of Planning and Building Controls: Discussion Document* (Wellington, New Zealand, May 11, 1984), 104-105.

²¹¹ Press Release issued by the Chairman, Cabinet Works Committee, dated 20 December 1983, and included in Office of the Review of Planning and Building Controls’ 1994 report.

²¹² Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 68.

²¹³ *Ibid.*, 63.

²¹⁴ (1990) 510 NZPD 4321

- ‘. . . the onus will be on building designers and constructors to ensure that their work is consistent with the standards required by the code, and that those standards will be maintained throughout the life of the building.’²¹⁵
- ‘At the local level each territorial authority will be charged with the administration of the Act and the building code.’²¹⁶
- ‘The Building Industry Authority will have an overview of the new building control system.’²¹⁷

The idea that the central authority’s role was limited to oversight, with the territorial authorities having the primary regulatory responsibility, was also emphasised in the BIA’s submission to the High Court: ‘Ms Scholtens [the BIA’s Counsel] made the point that BIA has a range of policy, quasi-legislative, educational and second level regulatory powers but is not the primary regulator of building work. That is left to territorial authorities and building certifiers.’²¹⁸

Effectively what evolved, although not anticipated in the original concept, was a reverse pyramid of responsibility (Figure 9). With the exception of owners this mirrored the legal liability that was attached in the various actions that were taken in relation to leaky buildings.

²¹⁵ (1991) 520 NZPD 5296

²¹⁶ (1990) 510 NZPD 4321

²¹⁷ (1990) 510 NZPD 4321

²¹⁸ *Body Corporate 200200 & Anor v Approved Building Certifiers Ltd & Ors* unreported, HC Auckland, CIV 2003 404 512, 2 February 2005, Williams J., para.69.

Figure 9: Reversing the pyramid of responsibility

Conclusion

What has emerged from this first comparative analysis is that conceptually there are two models for implementing performance-based regulation:

1. Model A is one where essential requirements couched in performance terms are mandated, and a regulator determines, through a process of citing specific compliance documents, approaches that are deemed to comply with the essential requirements. Compliance documents may be based on international standards, the standards of other jurisdictions or industry codes, but the key point is that there has been some form of standardisation process which is subject to regulatory oversight. The flexibility objective is satisfied because the model provides for more than one way of meeting the essential requirements and allows the suite of options to grow over time, unlike a traditional prescriptive regime.
2. Model B is one which again couches essential requirements in performance terms, but provides for both standardised solutions and alternative ways of meeting those requirements. The alternative route allows designers, constructors and manufacturers to develop unique approaches to meeting the essential requirements, and then these are subject to some form of approval.

The ORPBC proposed Model A. The BIC proposed Model B and this was reflected in the statute. But the BIC also envisaged that quality control would be exercised from the ‘centre’, albeit with the territorial authorities acting in a coordination and decision-making role on matters within their competence. What was delivered was an extreme version of Model B in-so-far as it was particularly enabling of alternative ways of meeting the performance requirements. Not only was quality control weak but, relative to what was envisaged by the BIC: (i) there was less explicit focus on the need to meet community expectations for buildings (ii) there was more focus on cost reduction as an goal (iii) there was less emphasis on the need for a comprehensive foundation of acceptable solutions, and (iv) there was less emphasis on acceptable solutions providing the benchmark for alternative solutions.

If it is accepted that Model A was already a significant change from the *status quo*, then it must also be accepted that the extreme version of Model B represents a dramatic change. The adoption of this model was intentional, but there is little evidence that weak control from the centre and the shift in emphasis were ‘planned’ in the sense that choices were made explicit and evaluated and conscious decisions made. Rather, a strong faith in market mechanisms and an emphasis on cost reduction, and inattention to the implications of choices, seem to account for the choices.

Overall, comparing what was conceived with what was delivered suggests strongly that there was a lack of understanding of what was being given up in making a fundamental shift from a standards-based regulatory regime to a performance-based regulatory regime, and a lack of awareness of the particular challenges associated with the new regime. Effectively New Zealand moved into an unknown future while burning its bridges to past practices.

A plausible explanation for the failure of the building control regime is, therefore, that the shift from one regime to another was so great that the existing coordination and control mechanisms were displaced, and the new mechanisms did not have time to evolve. Thus, there is risk associated with significant regime change that is independent of the performance-based character of the new regime.

This risk may be amenable to management through improved regime design. Given that regime change creates uncertainty, the law and institutions could have contained stronger obligations to monitor and take remedial action as issues emerged. The law could also have reduced uncertainty through incorporating more conservative norms and decision-making processes. For example, the Building Act 1991 required territorial authorities to be: ‘. . . satisfied on reasonable grounds’ that alternative solutions met the performance requirement of the building code, but did not provide any guidance on how that should be interpreted in situations where the science was uncertain. The interpretative challenge was compounded by requirements in the building code itself that a technology should achieve ‘adequate’ levels of health or safety, without being clear what adequate meant, or a process by which adequacy could be determined. In addition, the Building Act did not make clear the ‘rules of the game’ for elevating decisions from territorial authorities to the BIA, even though this was considered by the architects of the regime to be critical.

These risks may also have been able to be managed during the implementation of the regime without statutory change. Uncertainty around what was meant by minimum standards or the respective roles and responsibilities of control authorities, designers, builders and owners, or the weighting that should be put on community values relative to compliance cost reduction could have debated and clarified during the implementation period. This was not done and hence participants were left to rely on their own ideas and preferences. The new regime could also have been monitored and reviewed to identify emerging issues and resolve them. This was also not done, at least in a timely manner or with a focus on effectiveness.²¹⁹ To this extent the failure of the regime could also be attributed to a failure of implementation.

In summary, this iteration has revealed a number of issues that contributed to the failure of the new building control regime that were not intrinsic to performance-based regulation. In particular, regime change in itself created uncertainty through fundamentally shifting the basis

²¹⁹ In 1999 the Ministry of Commerce undertook a review of the Building Act 1991, with a particular focus on compliance costs, and at the time leaky building crisis was revealed in the media the Department of Internal Affairs was also conducting a review. Neither review appeared to identify a problem with leaky buildings.

on which the building sector was regulated and thus marginalising existing control mechanisms. Amongst other things the new regime created a high level of delegated decision-making, and assigned an important role to territorial authorities to coordinate information while giving them a lot of discretion over what they decided to elevate to the BIA. This level of discretion contributed to a lack of effective control within the regime, as the BIA chose not to take a proactive role in monitoring the regime, and was able to justify this by reference to the statute and underlying policy.

At another level, however, this iteration has provided some insights into the factors specific to performance-based regulation that may have contributed to the failure. Specifically, they are the assumptions underlying standards-setting that the architects of the regime believed needed to be relaxed to enable a performance-based regulatory approach:

1. The assumption of a standard approach to design needed to be relaxed to permit alternative solutions.
2. The assumption of inclusive (comprehensive and highly detailed) standards needed to be relaxed to permit a focus on essential requirements.
3. The assumption of consensus decision-making needed to be relaxed to permit more cost-benefit analysis.
4. The assumption of conservative decision-making needed to be relaxed to permit more innovation.

An analysis of the implications of relaxing these assumptions is discussed in the next section.

Comparison of standards-based regulation and performance-based regulation

Background

Performance-based regulation was promoted as an alternative to standards-based regulation, not because the latter was ineffective in achieving certain outcomes such as health and safety,

but rather because it did so inefficiently. This was made explicit by the BIC, under the heading: ‘Concerns with the present system’:

This complex system of control authorities, agencies and documents has ensured that buildings which endanger the health and safety of users are rare in New Zealand. All buildings have a potential for causing illness, injury, loss of life and damage to neighbouring property, yet the incidence of these events throughout the country is very low.

Concerns with the present system stem from other areas: requirements are complex and prescriptive; the system is unresponsive to technological change and inhibits innovation, and it absorbs large amounts of resources by central and local government in its administration, and by building producers in compliance, imposing heavy costs on the consumer.²²⁰

The objective of comparing a performance-based regulatory regime with a standards-based regulatory regime is therefore to identify those characteristics that are associated with effectiveness, or to put it another way, what is it about standards-based regulation that makes it ‘safer’ than performance-based regulation. For example, in shifting to a performance-based regulatory regime did we overlook or undervalue some important features of a standards-based regulatory regime that helped manage the interface between the building sciences, rules development and enforcement? Assuming that we can identify such features, is it then possible to deduce how a performance-based regulatory regime might need to be designed to address the key weaknesses that have been identified. Table 4 summarises the key points of difference, drawing on the previous section.

²²⁰ Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 24.

Table 4: Comparison of standards-based and performance-based regulatory regimes

Standards-based	Performance-based
Standardized technical specifications	Permits one-off and unique technical specifications
Specifications inclusive of a broad range of objectives, from safety/health to quality/best practice	Permits specifications to be restricted to regulatory objectives – such as safety, health.
Consensus decision-making based on groups of experts and interest groups	Permits judgments to be made on the advice of individual experts
Conservative decision-making norms	Permits more radical decision-making norms and hence more innovative approaches

This section describes a standards-based regulatory regime with particular reference to the features identified in Table 4 and compares it to a performance-based regulatory regime where these features are modified to permit more innovation. The purpose is to examine the extent to which these features contribute to making a standards-based regulatory regime comparatively safe.

General description of standards-based regulatory regimes

Standards-based regulatory regimes take a number of forms, but the common or generally repeated features can be described by reference to: (i) the interface between mandatory and voluntary standards, and (ii) decision-making norms and processes.

Interface between mandatory and voluntary standards

Mandatory standards or ‘technical regulations’ are standards that are required by law to be complied with. Commonly used definitions of standards and technical regulations are as follows:²²¹

²²¹ WTO, *The WTO Agreement on Technical Barriers to Trade*, Annex 1.

Standard: Document approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for products or related processes and production methods, with which compliance is not mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method.

Technical regulation: Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labeling requirements as they apply to a product, process or production method.

Conceptually it is helpful to maintain a distinction between a standard and the process by which it is mandated and its subsequent character as a rule. To some extent they can be thought of as existing in two separate domains. The first involves a voluntary process of interested parties agreeing to a specification for common usage. The second involves a judgment by the State that it is in the interests of the community as a whole that everybody complies with the standard. In other words it is a two step process, with the State taking advantage of a body of voluntary arrangements that occur outside of, and are independent of, the regulatory domain.

While this presents a simplified picture, not least because regulators also produce standards, the key point is not to confuse standards-setting with rule-making.

Continuing with this simplified picture, the ‘ideal’ standards-setting process can be described by reference to the norms, rules and procedures that dictate the behaviors of national standards bodies. In the New Zealand case the national standards body is the Standards Council. The Council is established by the Standards Act 1988. It is a member of the International Standardization Organisation (ISO) and International Electro-technical Commission (IEC), and is obliged to comply with the ‘Code of Good Practice for the Preparation, Adoption and

Application of Standards’, which is contained in Annex 3 to the WTO Agreement on Technical Barriers to Trade (TBT Agreement).

In summary, the key features of the ‘ideal’ standards-setting process are as follows:

1. Standards are to benefit the community as a whole in relation to such objectives as improved health and safety and economic development, not particular vested interests.
2. The standards development process should involve those who can both contribute expert knowledge, and represent the broad range of community interests.
3. Decision-making should be by consensus.
4. Standards and the standards development process should have certain features that have been agreed at the national or international level as important. For example, the Code of Good Practice requires standards bodies to use international standards as the basis of domestic standards wherever possible, and not prepare, adopt or apply standards that have the effect of creating unnecessary obstacles to international trade.

Standardisation vs. uniqueness

This section contrast the process of standardisation with the approval of alternative solutions, with particular regard to the assumptions that were relaxed, the weaknesses that were observed in the building control regime and the hypothesised measurement and accountability problems that arise with performance-based regulation.

The process of standardisation is characterised by: (i) a high level and intensity of participation in the process of developing and modifying standards (ii) the consensus norm that underpins decision-making (iii) the broad set of objectives that standards seek to achieve (iv) the strong mandate for the process, which is reflected in the authoritative nature of the documents that are produced, and (v) the incremental nature of change.

Participation

Participation is at three levels: the groups of people who collectively develop a standard; the people who are consulted on the standard; and the people who collectively decide to adopt the standard. The standards developers and decision-makers are generally selected on the basis of their expertise and standing with their peers. An inclusive approach ensures that both the information available to this broad group of people, and the knowledge embodied in this group, is aggregated – this includes technical knowledge provided by experts, practical knowledge provided by practitioners, and knowledge on community impacts and preferences provided by the broader set of community interests or their representatives.

Because participation in the development or decision-making process involves dialogue and debate, it also ensures that information and knowledge is assessed in relation to its reliability and the costs/benefits and risks of taking a particular decision. The assessment includes debating the weighting that should be put on particular objectives and the tradeoffs that may need to be made. The three levels of participation also provide checks and balances. What is decided at one level is scrutinised at another, and this is generally an open process.

Contrast this with the process of approving alternative solutions in a New Zealand building control context. Technical advice was provided by experts selected by territorial authorities. Because there was no embedded framework for selection, as is the case for standards committees, there was no guarantee that these experts were regarded highly by their peers. Experts were selected for their technical knowledge, but judgments on behalf of the community were also required. While the territorial authority was the decision-maker and could in theory have brought a community perspective, in practice they relied on the advice of the experts. Even if they had attempted to bring this perspective they would still be constrained by their own state of knowledge, unless they instigated a broader consultative process and/or established a committee structure to review the novel technologies. There were limited checks and balances, because territorial authorities did not typically elevate decisions to the BIA.

Consensus decision-making

Consensus is not the same as unanimity. It conveys the idea of a collective decision being taken having had regard to: (i) the information that is available to the standards committee or decision-making group (ii) participants' own knowledge as well as the knowledge of others around the table (iii) confidence by the participants that their own and others knowledge and views have been fully considered (iv) acceptance of the fact of having to take decisions in a situation of uncertainty, but at the same time decisions must be made (v) respect for the knowledge and views of others, and (vi) moderation of extreme views and self-interest.

While the BIC emphasised the important role of standards in supporting a performance-based regime,²²² it expressed reservations over the consensus-based development approach in the context of the building code:

Complete reliance on the consensus method of creating and amending standards is not compatible with the Code objectives for several reasons. It has proved to be very slow to satisfy changing needs and has tended to result in over regulation. In the absence of a clear statement of the objectives of building controls, no machinery for balancing the benefits against the costs of regulation has been developed.²²³

In the absence of a consensus-based system there is a greater need for formalised methodologies such as cost-benefit analysis and risk analysis to aggregate knowledge, to assess its reliability and the contribution that it can make to the decisions, and to make tradeoffs between competing objectives. The BIC laments the lack of this 'machinery' in a standards-based system, but in fact it was an implicit feature of consensus-building. For alternative solutions this feature was lost, and no new machinery was put in place.

²²² Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 50-51.

²²³ *Ibid.*

A broad set of objectives

Standards typically have a broad set of objectives which extend well beyond core objectives such as health and safety, and embrace the notion of ‘quality’. This can be illustrated by reference to the functions of the New Zealand Standards Council:²²⁴

The primary functions of the Council shall be to develop standards and to promote, encourage, and facilitate the use of standards in New Zealand with the object of—

- (a) Improving the quality of goods or services, having regard to economy in their production or supply; or
- (b) Promoting standardisation in industry, trade, or commerce; or
- (c) Encouraging and facilitating industrial development, trade, or commerce; or
- (d) Promoting public or occupational safety, health, or welfare; or
- (e) Minimising environmental risks; or
- (f) Promoting social responsibility.

In addition, the rule of thumb is that the target for standards is ‘best practice’, rather than minimum required to meet the objectives. A plausible interpretation of ‘best practice’ is that it reflects a consensus of what is optimum, having regard to a quality objective, the state of technology, and community expectations. Consensus is likely to arrive at some form of common denominator that everyone is broadly satisfied with, which is unlikely to be the lowest common denominator, particularly given the quality objective and broadly-based participation. This means that standards are likely to have a built-in safety margin.

The quality objective was largely lost in the shift to the new building control regime, with its emphasis on minimum requirements. While quality was not devalued as an attribute of buildings, it was devalued as an objective of the building control regime. At the same time the goals of innovation, cost reduction and choice were highly valued as attributes of the building control regime. Given devolved decision-making, individual or institutional preferences

²²⁴ Standard Act 1988, s10(1).

prevailed over community preferences. There was not an alignment between the two. For example:

1. Consumers – For many homeowners fashion guided purchasing decisions. There was an assumption by homeowners that the building control regime would provide the necessary level of protection. Consumers did not have a strong sense of having to take personal responsibility for value-for-money decisions. This meant that they demanded the largest house at the lowest price, were not sensitised to the quality of workmanship, and did not explore the track record of building companies.
2. Producers – producers were in a competitive market and this contributed to an emphasis on cost reduction. This extended to designs, materials, construction methods and the organisation of construction work. Cost-cutting is not the same as cutting corners, and the earlier conclusion that many dwellings were built by generally competent builders is relevant. That being said, producers were making decisions on efficiency grounds without being cognisant of the risks from a whole-of-building perspective.
3. Regulators – territorial authorities, private building certifiers and the BIA as institutions were imbued with a strong cost-minimisation culture. Individuals within these organisations may well have had different values, but were constrained by the organisational culture.

Authoritative documents

Standards are authoritative, in-so-far as they originate from authoritative institutions and have status as authoritative documents. This authority gives them normative value which extends beyond any legal backing. They are also published and widely circulated. Therefore standards are used as benchmarks and the basis of education and training.

Alternative solutions have not been through this process and do not have the same authority. They are also not as public. They do not act as benchmarks, and do not provide a catalyst for education and training.

Incremental change

Standards generally evolve over a period of time based on trial-and-error. For example, a standard to which a building is built is tested in an earthquake. The data that is provided leads to a reassessment of the standard based on what the community expects of the performance of buildings and current technical knowledge. While a modified standard may, from time to time, reflect a quantum change in either the state of knowledge or community expectations, the evolutionary process in a prescriptive regime can generally be characterised as conservative and incremental.²²⁵ In a standards-based regime, feedback loops occur through the standards committees. As a general rule these committees include people who have information on technology advancements, evolving community expectations and how technologies are working in the market place.

While alternative solutions are likely to have a foundation in existing knowledge, in the absence of a benchmark such as an existing standard it may not be possible to know how far they are pushing out the technology threshold. The absence of a formal structure for feedback and a mechanism by this can be reflected in documents also limits the scope for continuous improvement.

Summary

This section started with the idea that there may be something inherent in traditional standards-based regulatory regime that mean that the weaknesses identified in New Zealand's performance-based building control regime either would not arise, or would be effectively managed if they did arise.

²²⁵ Inter-jurisdictional Regulatory Collaboration Committee, Guidelines for the Introduction of Performance-Based Building Regulations (discussion paper) (IRCC, May 1998), 86.

The comparative analysis that I have undertaken confirms that this is the case. Standards-based regulatory regimes internalise the building sciences by involving a wide range of experts and enhancing the certainty of predictions by making only marginal changes to existing technology. At least implicitly such regimes also involve some form of risk assessment as they incorporate the views of both experts and the broader community. They are also likely to reflect a conservative and hence precautionary approach. The processes that underpin the development of standards have evolved over time and been institutionalised. While there are various definitions of ‘institution’, common to these are features associated with shared norms, and agreed processes and protocols for making decisions and ensuring that participants abide by the ‘rules of the game’.

The architects of New Zealand’s performance-based regulatory regime argued that some key assumptions associated with traditional standards-based regulatory regimes needed to be relaxed. The combined effect of this relaxation was that: (i) more radical technologies can be proposed which place greater demands on both the science and risk assessment (ii) participants in the decision-making process need to make finer and hence more risky judgments on what does or does not cross the line of acceptability, in-so-far as they must decide what is an acceptable ‘minimum’ having regard to specific objectives such as health or safety, rather than ‘best practice’ having regard to a broader quality objective, and (iii) moving away from consensus decision-making places more demands on formalised methodologies for making decisions.

The way in which performance-based regulation was implemented in New Zealand also permitted novel technologies to be approved on the basis of expert advice alone. A reliance on expert advice meant that the checks and balances inherent in a traditional standards-based regime which ensure that the level of expertise is appropriate and exercised dispassionately, and decisions are fully informed by available information and knowledge, were non-existent. If, however, the regime had been implemented as originally intended, at least some checks and balances would have been in place, as complex decisions would be elevated to, and resolved by, the BIA. This did not happen.

Lying at the heart of the comparison between standards-based and performance-based regulatory regime is the level of uncertainty each creates and how this is managed. Traditional standards-based regulatory regimes reduce the level of uncertainty by adopting a conservative strategy based on incremental trial-and-error, and manage the residual uncertainty through bringing together the best available knowledge and expertise in a representative and expert committee and decision-making structure. Performance-based regulatory regimes can permit a significant margin of uncertainty, coupled with weaker checks and balances.

Conclusion

Risks inherent in performance-based regulatory regimes

The New Zealand experience suggests that the risks associated with the introduction of performance-based regulation fall into three categories: the risks associated with a significant regime change, implementation risks and design risks.

Regime-change risks arise both when participants in the regulatory regime are required to fundamentally change their beliefs, rules of thumb and body of tacit knowledge, and knowledge, monitoring and enforcement institutions that have evolved over time based on traditional beliefs and values are no longer relevant. A vacuum can result and this can be filled by beliefs and interests that are not aligned with the intended goals of the new regime. The shift from a standards-based regulatory regime to a performance-based regulatory regime was a fundamental shift, and in a New Zealand context the failure of the new regime can be attributed in part to an inability of participants to adjust, and new institutions to evolve quickly enough.

Implementation risks arise if mixed and/or conflicting objectives are communicated, as this leaves it up to participants in the regime to decide what is most important, or undue weight is given in the communications to objectives which undermine the intended goal. They also arise if there is a lack of training and education of the participants in the regime to enable them

to rebuild their knowledge assets, as well as create an understanding of the new value proposition and what is required of them in the new regime. And they arise if there is inadequate monitoring of the regime as a whole or the performance of various elements of it, with an appropriate level of responsiveness to the problems that emerge.

Both regime-change and implementation problems contributed to the failure of the building regulatory control regime, but such risks are not unique to performance-based regulatory regimes.

The design risks are however of a different order. They are intrinsic to a performance-based approach which aims to push out the technology threshold, and hence must be dealt with in the design of a performance-based regulatory regime. They can be found in the patterns which emerged from the initial empirical investigation into the post-1991 performance-based building control regime, and can be classified as knowledge risks, systems risks and decision-making risks.

Knowledge risks arise when there is a lack of data, and both scientific knowledge and knowledge of community expectations, to make accurate *ex ante* decisions on whether or not a particular design, material or system meets the performance requirements, and *ex post* assessments of performance in the field. The more the technology threshold is pushed out the greater the risks.

Systems risks arise when there are poor processes for bringing all relevant data and knowledge to bear to inform critical decisions in a timely manner. Systems risks also arise if the decision-making environment - that is, the norms, rules and procedures for taking decisions - are not aligned with good decision-making.

Decision-making risks arise when the decision-makers do not have the level of expertise commensurate with the judgment required. Expertise in this context is the codified and tacit knowledge necessary to exercise good judgment, be it technical and/or associated with an acceptable level of risk.

It is axiomatic that not all decisions will require the same mix of data, knowledge and expertise. In some cases science that can be depended upon will be known or able to be acquired and the risks will be both known and within acceptable boundaries. Alternatively, the science may be uncertain (performance cannot be accurately predicted) but the costs of failure are low. These scenarios are likely to be the case in the majority of decisions as they will largely involve incremental changes to existing technologies. In other cases the science will be uncertain and the consequences of failure will be high. In such cases there will be a higher dependence on the judgment of experts. This spectrum is illustrated in Figure 10.

Figure 10: Decision-making under uncertainty (version 1)

Managing the risks while achieving the normative benefits of PBR

In addition to attempting to identify particular vulnerabilities of performance-based regulatory regimes, an objective of undertaking this comparative analysis was to find a key to unlock a regulatory regime that achieves the normative benefits of performance-based regulation of greater innovation, while reconfiguring the risks to bring them within tolerable limits. In particular, the comparison of New Zealand's performance-based regulatory regime with a standards-based regulatory regime was to identify features that led to 'safer' outcomes in the latter, albeit at a cost to greater innovation. The idea is that this might lead to the

identification of the key. For example, would it be feasible to replicate or compensate for one or more of these features while still achieving the normative benefits of performance-based regulation?

The options that have been identified in the literature to address the risk of performance-based regulation have generally involved adopting a conservative approach in high-risk areas. Some commentators have suggested that specification standards should be used in critical areas of health and the environment. Others have argued for establishing more meaningful measures of performance to increase certainty, enforceability and accountability. However, limiting novel solutions to those where performance can be accurately measured is tying the scope for innovation to the limitations of current measurement methodologies.

Coordination mechanisms and hierarchical decision-making are features of traditional standards-based regulatory regimes. They were also highlighted as important by the BIC, the latter in relation to designs, products and systems where there was doubt as to whether they met the performance requirements of the building code. While I argue that these features should be built into performance-based regulatory regimes and will go some way to addressing both the knowledge and systems risks, they do not resolve the problem of uncertainty that arises as the technology threshold is significantly pushed out.

Given this uncertainty, a judgment is required and hence there is a dependence on the expertise of the individual or group exercising the judgment. The greater the uncertainty the more reliant is the regime on expert judgment, and hence the qualities of the expert. In effect, the further a performance-based regulatory regime permits the technology threshold to be pushed out, the more the efficacy of the regime is dependent on expert judgment. It can therefore be inferred that the technology thresholds can be pushed out further if those exercising expert judgment can be relied upon, but not otherwise. This is a fundamental insight, and will be examined more fully in chapter 6.

However, while reducing knowledge, decision-making and systems risks will improve the quality of *ex ante* risk-based decisions notwithstanding uncertain science, the question is

whether this will eliminate the risk of failure of an innovative technology 'in the field'. If the answer to this question is no then improving the quality of *ex ante* decision-making through the exercise of expert judgment is but one of the strategies that need to be put in place to achieve innovation while managing the risks. I believe that a case can be made that in fact innovative technologies are experiments and should be explicitly treated as such by the regulatory regime. This proposition will be explored in chapter 7.

Chapter 6: Expertise and wisdom

Background

In the previous two chapters I provided an analysis of the leaky building phenomena and identified four weaknesses in New Zealand's performance-based regulatory regime as it operated in practice, followed by an analysis of the extent to which these weaknesses could be attributed to the unique characteristics of performance-based regulation. I concluded that, in a performance-based regulatory regime that permits the technology threshold to be materially pushed out, it is not possible to be completely certain how innovative technologies will work in practice because of weaknesses in *ex ante* assessment of performance.

The literature identifies two main strategies for managing these risks: revert to prescription in very high-risk areas, or improve measurement technologies such that innovative approaches to meeting performance requirements can be accurately assessed. Both strategies can be described as conservative, the first because it relies on the current stock of knowledge (embodied in prescriptive standards), and the second because it makes innovation conditional on developing reliable measurement technologies.

In this chapter I explore a third strategy, namely improving the quality of *ex ante* decision-making by applying intuitive expert judgment in complex decision-making contexts.

The chapter is structured as follows. I first discuss why decisions on what does or does not comply with performance goals can be highly complex, to the extent that they inherently involve making decisions in circumstances of significant uncertainty. I then describe different ways in which regulatory regimes might respond to uncertainty, concluding that leaving the response to chance is likely to result in a sub-optimum outcome if the objective is to push out technology thresholds while managing risks. I set the scene for a discussion on the role of experts by showing that they are already an important feature of performance-based regulatory regimes. I explore the question of 'what is an expert?' by reference to the sources of uncertainty that have earlier been identified. Finding the concept of 'expertise' limiting, I

extend the analysis to wisdom. Finally I ask whether, in situations where the technology threshold is materially pushed out and cost of arriving at the wrong answer is high, judgments are best made by groups rather than individuals.

Introduction

In what circumstances is judgment required when approving a technology that has a significant social content? The social content of new technologies can cross a broad spectrum. At one end the state of knowledge and/or consequences of failure are such that there is little risk. At the other end are examples such as seismic standards for buildings based on predictions on how buildings will perform in earthquakes or fire safety standards based on predications on how building occupants will behave in the event of a fire. While such standards are based on scientific knowledge they are not purely ‘technical’. They also set *levels* of predicted safety. Seismic standards provide an illustration. A seismic standard will contain a predication that a building design will withstand a force 7 earthquake. The implication is that it will not withstand a force 8 earthquake and in such an eventuality there is a probability of death and injury. Part of the calculation made by the standards setters is that, given the cost of engineering a building to withstand a force 8 earthquake, the community overall will be better off taking the risk of a lower standard.

Scientists and engineers have often sophisticated methods for predicting how technologies will perform, and the public policy community has techniques for assessing the community’s appetite for risk. It is tempting to accept these as providing certainty, that the technology is a known quantity, and that the risks are known and acceptable, or if the required knowledge does not exist now it is capable of being generated. This comforting approach is reflected in the description provided by Nelkin & Pollak on how risk controversies (people feeling less certain or safe) are managed by governments in Europe and the United States:

If lack of confidence is thought to be a problem arising from insufficient technical evidence, then the goal is to ascertain “scientific truth.” This leads to a structure based on scientific advice to public representatives. If the controversy is defined in terms of

alienation, a more participatory or consultative system is developed. And if the problem of public consensus is defined in terms of inadequate information, it is assumed that people oppose technologies because they are poorly informed. The task then becomes one of “education”.²²⁶

Other writers have also commented on this tendency to rationalise uncertainty by denying its existence, underplaying its significance or emphasising processes that will resolve it.²²⁷ In reality, in some situations there is no scientific ‘truth’, and while there may have been participation in decision-making, this is no guarantee of acceptance when the science or community preference-based assumptions are found to be incorrect and lives and property are lost. Woodhouse goes so far as to say that: ‘The starting point for technological decision making is to face up to the inevitability of uncertainty.’²²⁸

This conclusion is generally applicable to risk-based technical standards, and specifically applicable to performance-based regulatory regimes that permit the technology threshold to be materially pushed out.

Sources of uncertainty

Uncertainty in the sense that it is used here is uncertainty of outcome; that society will achieve its goals, be they in the areas of health, safety, environmental protection, overall wellbeing, or, at another level, care for the elderly, full participation in society by people with disabilities, or affordable housing. In a performance-based regulatory regime there is a ‘critical margin’ that defies precise measurement, giving rise to the two ‘headline’ sources of uncertainty, namely technical performance and community expectations. These can be embraced in the concept of ‘acceptable risk’. But there is another source of uncertainty, and that is associated with the

²²⁶ D. Nelkin and M. Pollak, “Public Participation in Technological Decisions: Reality or Grand Illusion?” *Technology Review* 81: 8 (1979), 55.

²²⁷ See Edward J. Woodhouse, “Sophisticated trial and error in decision making about risk,” in *Technology and Politics*, ed. Michael E. Kraft and Norman J. Vig (Durham: Duke University Press, 1988), 209.

²²⁸ *Ibid.*

need to take into account multiple objectives, and often make tradeoffs between competing objectives.

The difficulty of calculating ‘acceptable risk’

Performance-based regulation sets goals, the achievement of which often requires predictions to be made on the likelihood of certain events occurring, such as an earthquake, flood, fire, erosion, corrosion, accidental mishap, heavy usage, intentional damage; how something such as a building, car, aircraft, or workplace will perform in such an event; and the consequences of failure in terms of realised value.

Uncertainty arises in some cases because infrequent and episodic events such as the ‘100-year flood’ or ‘small probability risks’ (the one chance in a million that a chemical may cause an adverse reaction), cannot be accurately predicted. Breyer & Heyvaert have concluded that in relation to small probability risks: ‘Risk analysts often have no choice but to make simplifying, but scientifically questionable, assumptions (sometimes called “default assumptions”).’²²⁹ In other cases uncertainty arises because it is not possible to predict how something will perform in all of the circumstances of its use (including the affect of human behaviour on performance). There are often too many variables involved, and not enough real life experiences. Even assumptions that were correct at the time a new technology was put in place may not hold over time given unanticipated changes of usage or deterioration.

Formal methodologies for predicting technical performance such as modelling are important, but do not provide information that, on its own, can be relied upon.²³⁰ Both the literature and insights provided by practitioners highlight not only the limitations of formal methodologies, but also a tendency to overstate their reliability. At a workshop on performance-based

²²⁹ Stephen G. Breyer and Veerle Heyvaert, “Institutions for Regulating Risk,” in *Environmental Law, the Economy, and Sustainable Development*, ed. Richard L. Revesz, Philippe Sands, and Richard B. Stewart (Cambridge: Cambridge University Press, 2000), 294.

²³⁰ Cary Coglianese, Jennifer Nash and Todd Olmstead, *Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Protection* (Regulatory Policy Program Report No. RPP-03, 2002), 11.

regulation conducted by the Kennedy School of Government, participants noted that: ‘. . . the limitations of predictive models are frequently not well understood, so researchers do not even know what they do not know.’²³¹

Compounding the problem of uncertain science, performance-based regulation involves predicting community risk preferences. An important part of this calculation is the consequences of the technology failing, viewed through the lens of what the community considers to be acceptable having regard to the risk of failure, set against the benefits of the technology. An example is genetically modified organisms. The risk preference is the community’s willingness to accept the risk that such organisms will result in unanticipated and undesirable effects given the benefits of better crop yields, or to forgo those benefits because the risk are not considered tolerable.

I have used genetically modified organisms as it provides a topical illustration of the point. However, every decision to adopt a new technical standard or permit a new one-off technology, in situations where the science is uncertain and the community could be harmed if the technology fails, involves a prediction that the community is prepared to accept the risk, whether the decision-maker is aware that they are making this prediction or not. Equally, any decision to maintain an existing standard in the face of technological advances, or to prohibit a new one-off technology, involves a prediction that the community is not prepared to take the risk notwithstanding the reputed benefits.

There is no infallible methodology for calculating community preferences. The difficulties arise because: (i) the community is heterogeneous when it comes to risk. Individuals have different appetites for risk, and the benefits and costs of new technologies can fall

²³¹ Cary Coglianese, Jennifer Nash and Todd Olmstead, *Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Protection* (Regulatory Policy Program Report No. RPP-03, 2002), 11.

disproportionately on different individuals and groups within the community (ii) preferences can be irrational, and (iii) preferences are a moving target.²³²

Heterogeneity makes any sampling of preferences difficult, but more importantly it means that the ultimate judgment of what is acceptable to the community inherently involves favouring the preferences of some members over others. To this extent, the very concept of a community risk preference is flawed.

The idea of irrationality reflects our knowledge that risk preferences are influenced by degrees of voluntariness, catastrophic potential, controllability and dread. For example, we are more concerned about the risk of an aircraft crashing than a car accident, even though the risk of a car accident is greater, because we feel that we are in control behind the wheel of a car. We are particularly concerned about a nuclear disaster because of what we consider to be the catastrophic effects, even though the probability and consequences (in some circumstances) can be relatively low.

Irrationality is closely associated with the malleability of preferences. For example risk-aversion can be influenced by proximity to an adverse event. Publicity given to certain risks can also influence levels of anxiety and hence modify preferences even if the risks are low or the evidence is weak. Preferences also change as community norms evolve. We are by all accounts less tolerant of risk generally than we used to be.

Managing multiple objectives

While the headline sources of uncertainty receive most attention in the literature, the practical task of determining the acceptability of new technologies can require a broader set of

²³² There is a very large risk literature and the information I have provided on risk preferences can be found in examples such as: P. Slovic, "Perception of Risk," *Science* 236: 4799 (1987); Harvey M. Sapolsky (ed.), *Consuming Fears: The Politics of Product Risks* (New York: Basic Books, 1986); HM Treasury. *The Setting of Safety Standards*. London, June 28, 1996.

judgments to be made. Table 5 lists both the objectives that may be relevant to decision-making, and a simplified cost-benefit framework.

The sources of these objectives are a combination of international and domestic rules and conventions, government policy and ‘best practice’ public law and policy. They are the sorts of things that decision-makers should have regard to when: (i) setting voluntary standards (ii) making technical regulations, including regulations that are based on or incorporate standards that result from a voluntary standards-setting process, and (iii) making decisions within the framework of a regulatory regime that has been created to achieve a specific and additional purpose such as innovation.²³³

²³³ For a comprehensive list of expectations for performance-based regulatory regimes see: Peter J. May, “Performance-Based Regulation and Regulatory Regimes: The Saga of Leaky Buildings,” *Law and Policy* 25: 4 (2003), 389.

Table 5: Decision-making within the framework of performance-based regulation

The objectives are directly relevant in those cases where a standard or technical regulation is proposed as a means of compliance with performance goals. It may be argued that alternative solutions (one-off designs) are neither standards nor technical regulations, and hence these objectives are not relevant. I would disagree with this on two main grounds. The first is that alternative solutions can have many of the characteristics of both standards and technical

regulations and hence in principle, if not in law, the objectives should apply. For example, the method of construction involving a combination of monolithic cladding systems and untreated timber (an alternative solution) was approved by regulators and applied to more than 30,000 buildings in New Zealand over a period of a decade. It is hard to see any distinction between methods of construction or any other technology endorsed by a regulator and in common use, and a standard or technical regulation, even if they have not gone through what might be described as a ‘normal’ standards or regulation-making process. Secondly, in some regulatory regimes a mix of these objectives are contained in the primary statute that directs regulatory decision-making on alternative solutions.²³⁴

The following three examples illustrate how decision-making is made more complex in situations where there is already uncertainty associated with the science and community preferences.

Trade policy considerations

Domestic standards setters no longer have autonomy to make domestic regulations as they see fit. There are a complex set of applicable international rules, some of which require significant value judgments and possibly tradeoffs. A peak agreement is the WTO Agreement of Technical Barriers to Trade (TBT). The TBT agreement requires the signatories to comply with a number of principles, including: ensuring that technical regulations are no more trade-restrictive than necessary, taking account of the risks of not meeting legitimate objectives; using international standards as the basis of technical regulations whenever possible; and specifying technical regulations in performance terms wherever possible. Much of the writing on the relationship between performance-based regulation and international trade objectives is

²³⁴ For example, under the performance-based Hazardous Substances and New Organisms Act 1996, the Authority, in considering an application to approve a new hazardous substance, must apply a methodology which contains a broad range of objectives (some which go beyond those listed in Table 5), and a requirement to take into account risks, costs and benefits (Hazardous Substances and New Organisms (Methodology) Order, SR 1998/217).

presented in a positive light,²³⁵ emphasising that by establishing goals rather than prescribing how something must be done, this regulatory approach is fundamentally trade-friendly. However, Bukowski *et al* illustrates the challenges and tradeoffs, and hence the judgments that need to be made between competing objectives:

Performance based regulatory systems (PBRS) are being adopted by many countries as a means to rationalize building regulations and to allow more functional buildings at lower cost without sacrificing safety. This change from prescriptive regulation carries with it the need for many other changes to the regulatory infrastructure, not the least of which is in the area of standards. The strong linkages between standards and regulations are even stronger in PBRSs, especially where standards are cited in acceptable solutions. However when these are developed as international standards that are required to take precedence over local standards in order to prevent non-tariff barriers to trade, conflicts may occur with long-established local expectations, convention and/or building practice. Thus there must be some allowance for cultural and national norms even if there is some impact on trade.²³⁶

Regulatory cost reduction considerations

Domestic standards setters must have regard to government objectives to reduce the costs of regulation, particularly to business. The language associated with this objective has a normative element that can be as strong as the language associated with achieving community goals such as health and safety, such as ‘Cutting Red Tape’ and ‘Reducing the Regulatory Burden’. While the objective can be framed as one dimension of creating ‘better regulation’ or ‘smart regulation’ (achieving regulatory objectives at least cost), the emphasis on cutting costs can be seen as the dominant objective.

²³⁵ See Eleni Deroukakis, *Performance-Based Codes Impact on International Trade* (Inter-Jurisdictional Regulatory Collaboration Committee Occasional Paper. Canada: NRC, 2000).

²³⁶ Richard W. Bukowski et al, “Standards Linkages to a Performance-Based Regulatory Framework” (paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001), 262.

The leaky building crisis provides a graphic example of a situation where compliance cost reduction crowded out safety and health objectives. While this is an exceptional situation (thus demonstrating what can happen while not assuming that it will happen), a normal decision-making environment still requires attention to the cost-reduction objective, and this can require tradeoffs to be made.

Consultation considerations

Domestic standards setters must have regard to parliamentary and government objectives to improve the quality of engagement with affected parties on regulation. Regulatory Impact Analysis is underpinned by consultation. In a number of countries, including New Zealand, consultation is, in addition, both an administrative requirement, and often a legal requirement. A requirement to consult carries with it an obligation on decision-makers to have regard to what submitters have said. What weighting should they put on often competing claims by submitters on cost, benefits and risks? How should this influence the tradeoffs that decision-makers inevitably have to make between different objectives? In what circumstances, if any, should decision-makers subordinate their own judgment to that of the majority of submitters? These are real questions for today's decision-makers.

Responses to uncertainty

The previous section illustrated that decision-makers who decide whether to approve an innovation that materially pushes out the technology threshold, operate in an environment of significant uncertainty. How would we expect regulatory regimes to evolve in such circumstances? There is evidence that, over time, permissive regulatory regimes exhibit a conservative bias.

Underlying this bias is the degree of discomfort that decision-makers have with the level of discretion permitted when regulatory requirements are couched in general terms, although

pressure from the regulated sector for certainty could also be a contributing factor.²³⁷ The incentive on decision-makers is to specify what is required to meet the general requirements in a range of specific cases. Over time, the detailed specifications become *de facto* rules, embedding current technology in the regulatory regime. However, the effect is more complex than this, as the inflexibility of detailed specifications then leads to demand for more flexibility. The dynamic effect is convergence of general requirements and detailed specifications, as observed by Schauer:

. . . I want to suggest that the choice between rules and standards, between specific and vague directives, may not make nearly as much of a difference as is normally assumed. This is *not* because there is no difference between rules [prescriptive requirements] and standards [principles]. There *is* a difference, but there is also reason to believe that the adaptive behaviour of rule interpreters and rule enforcers will push rules towards standards, and standards towards rules.²³⁸

I accept that convergence permits a degree of flexibility, but also note that this is inherently coupled with a degree of prescription, unlike a pure performance-based regulatory approach which eschews *ex ante* prescription.

While there is scope for innovation in regulatory regimes that have a conservative bias, it is more likely to take the form of incremental trial-and-error. The process is open to new ideas, but only in small doses. It involves making relatively small changes to the status quo and responding to feedback to confirm, reject or modify the change.

The exception to this general description is when a regulatory regime takes on a particularly permissive character, enabling excessive risk-taking as participants operate beyond the limits of knowledge and make inaccurate predictions. The post-1991 building regulatory control

²³⁷ Eugene Bardach and Robert. A. Kagan, *Going by the Book: The Problem of Regulatory Unreasonableness* (Philadelphia: Temple University Press, 1982), 35.

²³⁸ Frederick Schauer, "The Convergence of Rules and Standards," in *The Statute: Making and Meaning*, ed. Rick Bigwood (Wellington: LexisNexis. 2004), 22.

regime in New Zealand is one example. Financial sector regulation pre-the current global financial crisis is another. While significant innovation occurs in such periods, we have seen that failed innovations can lead to a counter-reaction which involves a high level of regulatory intervention (a ‘pendulum effect’).

Wildavsky reports that incremental trial-and-error was the favoured approach in the 1960’s in situations of uncertainty.²³⁹ It cannot be ruled out as a strategy, particularly where the consequences of failure are high (unlike the pendulum effect which I would not advocate as a planned approach to fostering innovation). Nonetheless, incremental trial-and-error does constrain the application of new knowledge by entrepreneurs, and in the course of doing so may reduce incentives to generate new knowledge and to innovate. It may also be a strategy that, even if it is optimum in the short term, may prove not to be in the longer term, as noted by Wildavsky:

Incrementalism has weaknesses. It may not be possible, for instance, in the midst of vast number of interactions, to observe the consequences of small moves. Successive limited approximations may be too cautious a strategy, too small and too slow to succeed, whereas bolder faster moves might be successful.²⁴⁰

If permissive regulatory regimes in situations of significant uncertainty tend towards conservatism this involves a sacrifice of innovation that might otherwise have occurred. This would be appropriate if the only way to maintain the risks of innovating within limits the community is prepared to tolerate is to operate largely within the boundaries of what is known. My research challenge however, is to identify strategies which push out the boundaries of technology. If certain knowledge is the constraint, is there an alternative source of knowledge that can be relied upon?

²³⁹ Aaron Wildavsky, *But Is it True: A Citizen’s Guide to Environmental Health and Safety Issues* (Cambridge, MA: Harvard University Press, 1995), 429.

²⁴⁰ *Ibid.*

The key could be intuition, as foreshadowed by Keynes: ‘By limiting the possibility of certain knowledge Keynes increased the scope for intuitive judgment. Such judgment was, of course, applicable not only to ethical action but to all kinds of action.’²⁴¹ Intuition is also captured in the idea of expert judgment, which is a feature of decision-making in performance-based regulatory regimes.

The role of expertise and wisdom

Introduction

What if uncertainty can be reduced through applying the intuitive judgment of experts in situations where the capacity of measurement technologies to provide definitive answers runs out? This is not a theoretical or novel concept, but reflects what happens in reality. The literature on performance-based regulation does not, however, develop the idea that expert judgment is a plausible strategy in situations where technology thresholds are being significantly pushed out.

I commence this section by citing references to the role of expert judgment in performance-based regulatory regimes. These references illustrate that expert judgment is regarded as important, but leaves open the question: ‘what is an expert?’ Through exploring this question I end up differentiating between proficiency, expertise and wisdom.

Expertise

Experts a feature of performance-based regulatory regimes

The New Zealand Building Industry Commission (BIC), in a number of places in its 1990 report on the reform of building-controls, alluded to the important role of experts in a performance-based regulatory regime. In particular, it noted that:

²⁴¹ Skidelsky, Robert, *John Maynard Keynes: Hopes Betrayed 1883-1920* (London: MacMillan. 1983), 154.

To implement the performance-based approach in building controls, there must be known and available methods that allow performances of buildings and their component parts to be reliably predicted, so that compliance may be assessed in advance. This can be done in several ways: verification by test, calculations and measurement; conformity with examples of known performance and type approvals; application of expert judgment.²⁴²

The BIC also referenced a building controls risk assessment it commissioned which went so far as to say that there was no generally useful methodology based on probability theory and statistical data to assess risk levels, other than: ‘. . . the traditional basis of expert judgment, public comment and relevant government policies.’²⁴³

In 2001 Beller *et al*, made the same point in relation to Australia’s performance-based regulatory regime: ‘. . . performance requirements are qualitative statements which define the required level of performance . . . if deemed-to-satisfy provisions are not used, then the designer must demonstrate that the performance requirement is satisfied by using one of the available assessment methods: documentary evidence, verification methods, expert judgment or comparison to the deemed-to-satisfy provisions.’²⁴⁴ Participants in the 2002 Kennedy School of Government Workshop on Performance-Based Regulation emphasised the same point:

Performance-based regulation may demand more explicit attention to goals and uncertainties The key, it was suggested, is to use all of the available evidence at hand:

²⁴² Building Industry Commission, *Reform of Building Controls (vol.1)* (A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990), 47.

²⁴³ *Ibid.*: 26.

²⁴⁴ D. Beller et al., “Qualitative Versus Quantitative Aspects of Performance-Based Regulations” (Paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001), 70.

statistical, laboratory, and expert judgment. A systematic approach to this evidence can help focus decision-making on the important issues.²⁴⁵

Others sources infer that in complex rule-making contexts expert judgment is not restricted to technical expertise. Rowe notes that setting standards of acceptability for society involves value judgments in three classes: technical, societal, and managerial, going on to say that when societal judgments are required: ‘. . . scientists or technical experts have no more expertise in this area than any other well-informed interested citizen.’²⁴⁶ May elaborates on this, suggesting that rule-making requires: technical expertise to develop standards; legal expertise to develop rules; economic expertise to undertake regulatory impact analysis, and broader management expertise to integrate technical, legal and economic information.²⁴⁷

Finally, the selection criteria for experts introduce the idea that there is a correlation between expertise and professional standing. For example, membership of technical expert groups established under the auspices of the WTO TBT Committee is ‘restricted to persons of professional standing and experience in the field in question.’²⁴⁸

A general description of expertise

What do these sources mean when they refer to experts and expert judgment? I have considered the possibility that they mean someone who has acquired the information and skills to ‘know’ something, that is to ‘be absolutely sure of something’ in the sense that what they know is the ‘truth’. However, I have discounted this possibility. It is clear from the

²⁴⁵ Cary Coglianese, Jennifer Nash and Todd Olmstead, *Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Protection* (Regulatory Policy Program Report No. RPP-03, 2002), 12.

²⁴⁶ William D. Rowe, *An Anatomy of Risk* (New York: John Wiley & Sons, 1977), 5.

²⁴⁷ Peter J. May, “Social Regulation,” in *Tools of Government: A Guide to the New Governance*, ed. Lester M. Salamon (New York: Oxford University Press, 2002), 166.

²⁴⁸ WTO, *The WTO Agreement on Technical Barriers to Trade*, Annex 2.

context in which expert judgment is discussed that it reduces but does not eliminate uncertainty.

Experts are understood to have passed a threshold associated with qualifications, experience and professional standing, but their weaknesses are also recognised. Otway identifies a number of real or perceived failings by ‘experts’ in the public eye. These included accidents that are attributed to oversight and overconfidence by experts, ‘facts’ that are ‘conditioned by political, organizational, and peer pressures’; experts sometimes being: ‘. . . blinded by arrogance and the received wisdom of their own discipline’; and experts going outside their area of expertise.²⁴⁹

Otway also points to the fact that uncertainty can result in experts legitimately reaching different answers: ‘The complexity of new technologies meant that uncertainties were larger, that there was more room for honest disagreement among experts who were now talking about unverifiable probabilities instead of the kind of “facts” they were used to.’²⁵⁰

With a view to developing a person specification for an ‘expert’ I also found it helpful to refer the Concise Oxford English Dictionary (revised) 2006. The relevant definitions are:

Expert: A person who is very knowledgeable about or skilful in a particular area.

Judgment: The ability to make considered decisions or form sensible opinions.

Knowledge: Information and skills acquired through experience or education.

Knowledgeable: Intelligent and well informed.

²⁴⁹ Harry Otway, “Experts, Risk Communication, and Democracy.” *Risk Analysis* 7: 2 (1987): 125.

²⁵⁰ *Ibid.*, 125

At a minimum I suggest that exercising expert judgment is essentially a cognitive process requiring specific knowledge, the personal discipline to keep within one's area of knowledge, avoid over-confidence and extraneous influences that distort judgment, and to have something in addition which is captured by the idea of professional standing.

Taking this a stage further, the person specification for novel and complex situations where the consequences of making the wrong judgment is high, is someone with relevant expertise based on qualifications and experience, well-informed, intelligent, reflective and sensible, and recognised as such by their peers. They must be able to accurately predict the performance of innovative technologies in situations where data and modelling cannot be relied upon, and assess community expectations which are inherently subjective, context-specific and evolving. They must integrate their specific knowledge with the government's broader policy objectives, and existing policy/legal frameworks, assess the overall costs and benefits and tradeoffs, and form a judgment 'in the whole' that minimises the risk of regulatory failure. As such, those in whom we could have confidence are:

- Not people who just have qualifications and limited experience.
- Not average or even good performers in their area of expertise – they must be superior.
- Not solely 'technical', unless they have additional attributes which derive from different experiences.
- Not just very experienced.

However, this is rather unsatisfying. We know that there is a threshold below which we cannot expect someone to exercise expert judgment. We also have a general sense of the attributes of those who can exercise expert judgment given the demands of a performance-based regulatory regime. We are also able to identify a selection process based on peer recognition or professional standing. But this is not enough. The person specification is highly ambitious. Such a person may not exist, or the 'person' may actually a group of people who can exercise expert judgment collectively, but only if the group is configured in a particular way. We are exposed if, in situations of exceptional novelty and complexity, where the consequences of poor judgment are high, we rely on a regime that in turn is dependent on

instinct, intuition, ‘gut feeling’, all soft attributes rather than hard science; that is, a regime based on trust.

We need an empirical basis for this trust. We need to know in general that these people do exist. There is body of literature that establishes empirically that there is a special sort of expert whom we can trust to make accurate intuitive judgments, including predictions.

Distinguishing between proficiency and expertise

A 2006 article by Ross in *Scientific American* entitled The Expert Mind drew together the insights from a number of writers on expertise.²⁵¹ Focusing initially on the capacity of chess masters who play a room of amateur chess players, spending perhaps three seconds on each move, and still win, the article asks: what is an expert? While a full understanding of how experts process information is still unclear, the article concludes that ‘. . . much of the chess master’s advantage over the novice derives from the first few seconds of thought’ and is ‘knowledge-guided perception’. A number of other points are made: ‘. . . it takes enormous effort to build these structures in the mind’ and, citing K. Anders Ericsson of Florida State University ‘. . . what matters is not experience per se, but ‘effortful study,’ which entails continually tackling challenges that lie just beyond one’s competence.’ The generally held view is that the process can take a minimum of ten years, leading to the formulation of the ‘10-year rule’. Ross notes that experts are not confined to chess, but could be in many other fields.

If it is taken as read that expert judgment is required in a performance-based regulatory regime, and if it is accepted that expert judgment is the exercise of ‘knowledge-guided perception’, how are experts identified and engaged, and how are nonexperts filtered out? Ross cautions against designating someone as an expert on the basis of qualifications and

²⁵¹ Philip E. Ross, “The Expert Mind,” *Scientific American*, July 24, 2006. Also published in 2006 was *The Cambridge Handbook of Expertise and Expert Performance*, which describes itself as ‘the first handbook where the world’s foremost experts on expertise review our scientific knowledge on expertise and expert performance’. While not referred to by Ross, the *Handbook* includes the ideas contained in his article, albeit in much more detail.

experience alone: ‘Without a demonstrably immense superiority in skill over the novice, there can be no true experts, only nonexperts with imposing credentials. Such, alas, are all too common.’ Should it be thought that the reference to ‘nonexperts’ relates to the common definition, of people without specialist knowledge, Ross notes that: ‘Rigorous studies in the past two decades have shown that professional stock pickers invest no more successfully than amateurs, that noted connoisseurs distinguish wines hardly better than yokels, and that highly credentialed psychiatric therapists help patients no more than colleagues with less advanced degrees.’

Dreyfus & Dreyfus bring some structure to the distinction between experts and others, with their five-stage model of progress from novice to advanced beginner to competent to proficient and finally to expert.²⁵² The distinction between ‘proficient’ and ‘expert’ is of most interest. Those at previous stages would not qualify as experts based on the earlier discussion, whereas those who are proficient may well be considered experts in the normal course of events. Based on the Dreyfus & Dreyfus taxonomy, both the proficient and the expert can make intuitive judgments, drawing on training and experience to identify and choose between alternatives. The distinction between the two, apart from the fact that the expert is more consistently intuitive, is that the merely proficient relies on past experiences to ‘pattern match’ current situations and draw conclusions based on those pre-existing patterns, whereas the cognition of experts is based on, but not limited by, past experience, and hence they are in effect able to be more creative.

H. Dreyfus said in an interview that he is not talking about creativity in the sense of: ‘. . . coming up with something that’s not like anything that you’ve seen before, and which works, and works consistently’. Rather, Dreyfus’s creativity comes from applying past experience to an entirely new situation.²⁵³ This distinction is helpful. The merely proficient can recall like

²⁵² Sophie Haroutunian-Gordon, “Mind over Machine: a Plea for the Intuitive Conception of Mind,” review of *Mind Over Machine: The Power of Human Intuition and Expertise in the Era of the Computer*, by Hubert L. Dreyfus and Stuart E. Dreyfus. *Educational Researcher* 17: 3, 1988, 50-52.

²⁵³ Mishlove, Jeffrey. Transcript of an interview with Hubert Dreyfus. From the series “Thinking Allowed, Conversations On the Leading Edge of Knowledge and Discovery.” <http://www.intuition.org/txt/dreyfus.htm> (accessed July 4, 2007).

situations and what worked in such a situation, and quickly, without overt analysis, apply that knowledge to the issues or question at hand. The expert can make connections between situations which the merely proficient would not recognise as having a connection. Reason makes a similar point:

No matter how expert people are at coping with familiar problems, their performance will begin to approximate that of novices once their repertoire of rules has been exhausted by the demands of a novel situation Expertise consists of having a large stock of appropriate routines to deal with a wide variety of contingencies In general, experts represent the problem space at a more abstract level than nonexperts.²⁵⁴

Tetlock draws on Isaiah Berlin's analogy of hedgehogs and foxes (which in turn is taken from Aristotle, revealing an abiding historical interest in this subject) to analyse different modes of thinking. Hedgehogs describe those of us who know one big thing, albeit very well, but are cognitively bounded by what they 'know' to be correct. It is not just that hedgehogs know one big thing; they prefer to stick to what they know, and therefore are somewhat impervious to knowledge beyond their specialist domain. Foxes on the contrary know many things, are more open to external knowledge, and are generally more enquiring and creative in their thinking.

While both hedgehogs and foxes are subject to error, Tetlock notes that: 'Across several samples and tasks, people who value closure and simplicity [hedgehogs] are less accurate in complex social perception tasks and more susceptible to overconfidence, hindsight, and belief perseverance effects.'²⁵⁵ Foxes are more successful: '. . . but enjoy their most decisive victories in long-term exercises inside their domains of expertise.'²⁵⁶ Fisher also seems to be referring to the particular mode of thinking of foxes when noting: '. . . the concept of

²⁵⁴ James Reason, *Human Error* (Cambridge: Cambridge University Press, 1990), 58.

²⁵⁵ Philip E. Tetlock, *Expert Political Judgement: How Good Is It? How Can We Know?* (Princeton: Princeton University Press, 2005), 162.

²⁵⁶ Philip E. Tetlock, *Expert Political Judgement: How Good Is It? How Can We Know?* (Princeton: Princeton University Press, 2005), 21.

“expertise” in risk regulation should not be understood narrowly as simply referring to a scientist or someone only skilled in applying a certain methodology to the facts. Rather, it refers to professional judgment. Judgment requires intuition, creativity, and a sensitive grasp of the issues.²⁵⁷

Berlin himself takes a more expansive view of the attributes of foxes than comes through from Tetlock and Fisher. He considers that such people are wiser rather than more knowledgeable than others:

. . . It is not their deductive or inductive reasoning that makes them masters; their vision is more ‘profound’, they see something that the others fail to see; they see the way the world goes, what goes with what, and what never will be brought together; they see what can be and what cannot; how men live and to what ends, what they do and suffer, and how and why they act, and should act, thus and not otherwise.²⁵⁸

Summing up on expertise

Having started with the question ‘what is an expert’, it is now possible to draw some conclusions. The first is that the context for decision-making is critical. With performance-based regulation we are potentially having to make intuitive judgments (judgments made where there is significant uncertainty) that are both highly technical and very sensitive to community expectations, and where the judgment must also have regard to a broader set of objectives that have their origin in constitutional/legal norms, international obligations, and government policies.

Technical experts are required to make technical judgments. Predicting how a complex building technology might perform in the field is not something that you would assign to

²⁵⁷ Elizabeth Fisher, “Drowning by Numbers: Standard Setting in Risk Regulation and the Pursuit of Accountable Public Administration,” *Oxford Journal of Legal Studies* 20: 1 (2000): 116.

²⁵⁸ Isaiah Berlin, “The Hedgehog and the Fox,” in *The Proper Study of Mankind: An Anthology of Essays*, by Isaiah Berlin (New York: Farrar, Straus and Giroux. 1998), 489.

someone who does not have the necessary qualifications and experience in relevant fields. But we need to be more expansive in our definition of a ‘technical expert’. In addition to engineers and architects there might be a need for a psychologist who is able to predict how people will react in a fire. Recognising that there are a broader set of objectives, there may need to be a legal expert who can construct ‘standards as rules’ that work within the broader legal framework, and a trade policy expert who is able to judge the trade implications of different regulatory approaches.

The 10-year rule is a useful benchmark for the length of time that it takes to become an expert, but the process of developing expertise is a function of more than just time. The literature on experts suggests that the necessary ‘knowledge-guided perception’ must be cultivated over a long period of time and with a diverse range of relevant experiences, and at all times such experts are challenging their own understandings and pushing out the threshold of their knowledge.

This literature is insightful in-so-far as it allows us to differentiate between those who are proficient relative to those who are expert, and to attribute to the latter an ability to make accurate intuitive judgments in situations of considerable uncertainty. As such this literature highlights both risks and opportunities in relation to the role of experts in performance-based regulatory regimes. The risks arise when we assume that someone is an expert when they are merely proficient, and rely on their judgment in complex decision-making contexts. The opportunities arise because we know that there are ‘superior’ experts who have the capacity to make accurate intuitive judgments in such contexts. Their intuition is a particular type of knowledge that we can rely upon.

But does the literature on experts take us far enough? Some of those who research this topic recognise that much of the literature focuses on those who are skilled in a particular domain and: ‘. . . relatively well-structured systems of knowledge’,²⁵⁹ whereas the decision-making

²⁵⁹P. B. Baltes and J. Smith, “The Psychology of Wisdom and its Ontogenesis,” in *Wisdom: Its Nature, Origins, and Development*, ed. R. J. Sternberg (New York: Cambridge University Press, 1990), 94.

contexts that arise in performance-based regulatory regimes require a multi-disciplinary approach and trade-offs to be made between competing community objectives. The boundaries of the literature on experts are also fuzzy, and the ideas of breadth of knowledge and awareness, and even vision, have been associated with those whose intuition we can rely upon. These ideas are in common with the literature on wisdom, and this proved to be the logical place to go for additional insights.

Wisdom

Introduction

Socrates sought out wisdom and this led him to the craftsman. They are expert in their field and therefore must surely be wise. In fact the craftsmen were not wise because: ‘The most knowledgeable of the bunch, the craftsmen, knew quite a bit about their craft, but they claimed to know things far beyond the scope of their expertise.’²⁶⁰

Socrates described his notion of wisdom, and this has a number of dimensions relevant to taking decisions in situations of uncertainty.²⁶¹ The first is that those who are wise have a capacity to evaluate information, ideas and opinions that relate to the judgment to be exercised. The second is that in undertaking this evaluation those who are wise are aware that their own specific knowledge is limited. They do not have the ‘conceit’ of wisdom. Thirdly, those who are wise understand, at a deep and intuitive level, what is of ‘value’; being that which is good (in our case good for the community):

. . . knowledge involves more than true opinion. The opinion must be evaluated and evaluation brings in value. One must be able to discern what is worth believing from what is not. To do that one must understand what gives something worth, that is, what gives it value. One must understand the difference between what it is good to believe and what is

²⁶⁰ Stanford Encyclopaedia of Philosophy. <http://plato.stanford.edu/entries/wisdom>.

²⁶¹ See the discussion in Keith Lehrer and Nicholas D. Smith, “Knowledge, Teaching and Wisdom,” in *Knowledge, Teaching and Wisdom*, ed. Keith Lehrer et al (Dordrecht: Kluwer Academic Publishers, 1996).

not, and, thereby, we reach the connection between knowledge and the vision of the good.²⁶²

The recent literature on wisdom reinforces these attributes: a capacity to evaluate in full knowledge of one's own limitations; and to be able to discern value. Wisdom is also seen as a form of knowledge that involves intuition.²⁶³

A capacity to evaluate

The wisdom literature breaks down knowledge - being that which you must have to be able to evaluate and ultimately judge - into specific elements.²⁶⁴ Included in these is factual knowledge in a specific domain that has been acquired over an extended period of time. To this extent the wisdom literature is consistent with the literature on expertise. However, the wisdom-specific domain is the 'pragmatics of life'.²⁶⁵ Understanding life's pragmatics requires an intuitive sense of how societies function, and in particular the factors that influence incentives on individuals and groups and how these are reflected in behaviours within society. This understanding is interdependent with an ability to empathise; to put one's self in the position of others and see the world through their eyes. Given that there are also

²⁶² Keith Lehrer and Nicholas D. Smith, "Knowledge, Teaching and Wisdom," in *Knowledge, Teaching and Wisdom*, ed. Keith Lehrer et al (Dordrecht: Kluwer Academic Publishers, 1996). 5.

²⁶³ See A. Assmann, "Wholesome Knowledge: Concepts of Wisdom in a Historical and Cross-Cultural Perspective," in *Life-Span Development and Behavior* 12, ed. D. L. Featherman, R. M. Lerner and M. Perlmuter (Hillsdale, NJ: Erlbaum, 1994), 203/204; V. Clayton and J. E. Birren, "The Development of Wisdom Across the Life Span," in *Life Span Development and Behavior*, 3, ed. P. B. Baltes and O. G. Brim (New York: Academic Press, 1980), 118/119.

²⁶⁴ For a detailed discussion on these elements see: P. K. Arlin, "Wisdom and Expertise in Teaching: An Integration of Perspectives," *Learning and Individual Differences* 5: 4 (1993): 342; P. Baltes, F. Dittmann-Kohli and R. Dixon, "New Perspectives on the Development of Intelligence in Adulthood: Toward a Dual-Process Conception and a Model of Selective Optimization with Compensation," in *Life-Span Development and Behavior* 6, ed. P. B. Baltes and O. G. Brim, Jr (New York: Academic Press, 1984), 66; Jacqui Smith and Paul B. Baltes, "Wisdom-related Knowledge: Age/Cohort Differences in Response to Life-planning Problems," *Developmental Psychology* 26: 3 (1999): 494/495; R. J. Sternberg, "A Balance Theory of Wisdom," *Review of General Psychology* 2 (1998): 354.

²⁶⁵ P. Baltes, F. Dittmann-Kohli and R. Dixon, "New Perspectives on the Development of Intelligence in Adulthood: Toward a Dual-Process Conception and a Model of Selective Optimization with Compensation," in *Life-Span Development and Behavior* 6, ed. P. B. Baltes and O. G. Brim, Jr (New York: Academic Press, 1984), 66.

incentives working on evaluators that could affect their objectivity, they also need to ‘know themselves’.

In addition to understating how societies function generally, evaluators need to be able to discern how society is working in a particular context. In other words they must be accurate in their assessments of the ‘state of the system’,²⁶⁶ and as a part of this, assess both problems and possible solutions. To undertake the latter, evaluators must have a good understanding of what is important to society, and the procedures that should be followed to resolve problems in the best possible way in situations of uncertainty.²⁶⁷ Assmann, quoting Welsch, suggests that a wise person is: ‘. . . the expert for the uncertain’ and ‘. . . the expert in problems for which no rules exist’.²⁶⁸

An ability to discern and pursue value

Over and above a capacity to evaluate is an ability to discern and pursue value. This is to both know what is good and what is not, and to do what is right (there is a moral or ethical component).

‘Good’ in the sense that it is used here is ‘good for the community’. Because the community is heterogeneous in its preferences this means being able to make trade-offs between competing objectives such that the community is better off relative to the state that it would have been if a different choice had been made. In fact, there is a fine line between a capacity to evaluate and an ability to discern value, if the former includes understanding what is important to the community and the latter what is good for the community. But there is a distinction, and this can be illustrated by reference to the leaky building crisis. What was

²⁶⁶ Geoffrey Vickers, *The Art of Judgment: a Study of Policy Making* (Thousand Oaks: Sage Publications, 1995), 40.

²⁶⁷ John Kekes, *Moral Wisdom and Good Lives* (Ithaca: Cornell University Press, 1995), 27.

²⁶⁸ A. Assmann, “Wholesome Knowledge: Concepts of Wisdom in a Historical and Cross-Cultural Perspective,” in *Life-Span Development and Behavior 12*, ed. D. L. Featherman, R. M. Lerner and M. Perlmutter (Hillsdale, NJ: Erlbaum, 1994), 203/204.

initially considered important was consumer choice and low compliance costs. What was shown to be of value was the intrinsic role of housing in the social fabric of society. Assmann's essay on wisdom applies this concept of differentiating what is of value from what might be considered important at a particular point in time when posing the question: 'What maxims would be appropriate in our contemporary world?'²⁶⁹ His suggestions include living with a responsibility for generations to come, and not wasting natural resources. Wisdom involves discerning value, and having a capacity to evaluate a situation with a view to determining the best approach to pursuing value.

Discerning value is not the same as pursuing value, and wisdom is also associated with a propensity to do what is right. As noted by Sternberg: 'It is impossible to speak of wisdom outside the context of a set of values, which in combination may lead one to a moral stance . . .' and: 'In the subset of practical intelligence that is wisdom, one certainly may seek good ends for oneself (intrapersonal interests), but one also seeks to balance them with good outcomes for others (extrapersonal interests)'.²⁷⁰

Summing up on expertise and wisdom

The insights provided by the literature on both expertise and wisdom have painted a rich picture of what is both required, and must be applied to decision-making in a performance-based regulatory regime. We start with the idea that expert judgment entails making accurate predictions in three dimensions: (i) how a technology will perform 'mechanically' in a wide range of plausible conditions (ii) whether the risk of non-performance is something that the community will tolerate given the costs of mitigating such a risk (including sticking with known technologies), and (iii) the relevance of spill-over costs, benefits and risks, such as impacts on regulatory costs and trade.

²⁶⁹ A. Assmann, "Wholesome Knowledge: Concepts of Wisdom in a Historical and Cross-Cultural Perspective," in *Life-Span Development and Behavior 12*, ed. D. L. Featherman, R. M. Lerner and M. Perlmutter (Hillsdale, NJ: Erlbaum, 1994), 209.

²⁷⁰ R. J. Sternberg, "A Balance Theory of Wisdom," *Review of General Psychology* 2 (1998): 355/356.

The literature on expertise has identified a particular sort of expert who is able to make these predictions quickly and intuitively. This literature differentiates between those who are proficient and thus able to make intuitive judgments in a specific technical area based on incomplete information by drawing on past experience in like situations, and those who are truly expert, and thus able to make intuitive judgments by making connections between broader sets of knowledge which are beyond the cognitive capacity of those who are just proficient. In this sense experts are creative, although this creativity is grounded in experience. Berlin and Tetlock, drawing on the analogy of the hedgehog and fox, identify that breadth of knowledge is a requirement for expert judgment.

The wisdom literature suggests that to be an 'expert' in a technical domain is not sufficient in situations where community as well as technical judgments need to be made. This literature reveals what attributes are required of those who are 'more than experts'. These attributes are the ability to evaluate, discern and promote value.

Elevating a certain group of experts to the status of those who can be described as wise runs the risk of diminishing the role of specialists who have not attained this status but are an essential ingredient in the mix of knowledge that contributes to decision-making in a performance-based regulatory regime. This is best explained by describing two scenarios.

The first scenario involves a prediction that needs to be made on how a new technology is likely to perform in particular circumstances. There is experience in this area but the knowledge has not been codified and it is fragmented. Parts of the picture are held in the heads of a number of people, but collectively the picture is complete. The level of social content in the judgment is low. In this situation there is uncertainty but this is associated with a lack of coordination and codification, and those who are proficient are able to exercise good judgment subject to addressing the coordination problem.

The second scenario also involves a prediction that needs to be made on how a new technology is likely to perform in particular circumstances. As with the previous scenario there is experience in this area but in this case it is incomplete, and the level of social content

in the decision is high. In this case the input of those who are proficient is likely to be important, but both expert judgment and wisdom is also required.

The point I am making is that analysis of performance-based regulatory regimes points to a set of conditions for ensuring that good judgment is exercised. Firstly, one must ensure that when expert judgment is required it is being exercised by people who are competent to do so. Secondly, when a broad suite of technical expertise is required it is drawn upon. Thirdly, in situations where there is significant technical uncertainty and a high social content I argue that something in addition to expert judgment is required. This is wisdom, which is the capacity to make judgments that are steeped in a deep and abiding understanding of the human condition in a contemporary and dynamic (forward-looking) context that reflects an understanding of value, and are ethical.

The role of nonexperts

I assume that technical experts can be wise, although it would be an attribute that was in addition to their technical expertise. I now extend my enquiry to the role of nonexperts. Specifically, can nonexperts be ‘expert’ or ‘wise’ in the sense that they can make accurate intuitive judgments in complex decision-making contexts that arise in performance-based regulatory regimes? To help answer this question I have returned to the regulatory literature for insights.

A useful introduction to this is provided by the *Report of the Committee on Building Legislation in Scotland* (1957) relating to the role of the Guild Courts in making decisions on whether particular designs (effectively alternative solutions in our terminology) meet the performance requirements in the regulations (having received advice from qualified building control officials employed by the Burgh). The report recommends that the Guild Courts should have this role, and goes on to note:

As for the inclusion of experts, it is true that the enactment of regulations in terms of “performance standards” will make it more important than it has been until recently for the

Court to have adequate technical advice; but we consider that this need should be met by the appointment of suitably qualified officials (supplemented in exceptional cases, perhaps, by the skilled advice of outside individuals, such as officers of the Building Research Station) rather than by the inclusion of “men of skill” as members of the Court.

These functions seem to demand not so much technical skill as the qualities of commonsense and detachment which laymen can contribute. In the words of Professor K. C. Wheare, ‘It is not so much knowledge . . . which a layman is expected to bring to his work in committees as sense, commonsense.’ His function ‘is to check the excesses of bureaucratic and expert nonsense by the application of his own commonsense.’²⁷¹

The idea that nonexperts can exercise good judgment in highly technical areas is also contained in the more recent literature on risk. For example, Slovic concludes that: ‘. . . there is wisdom as well as error in public attitudes and perceptions’ of risk, and: ‘. . . their basic conceptualization of risk is much richer than that of the experts and reflects legitimate concerns that are typically omitted from expert risk assessments.’²⁷² Isaacson notes: ‘While scientists have been unable to reach conclusions, public instincts have been largely sound.’²⁷³

This requires us to examine the possibility that nonexperts are a source of ‘expert’ judgment, or alternatively, judgment without a requirement for associated expertise, at least in the usual meaning of the term. But this examination requires, in the first instance, an understanding of the many ways in which nonexperts may contribute to the exercise of judgment.

Nonexperts as a source of data

Formal techniques such as cost-benefit analysis and risk analysis require empirical information to inform the analysis at two main stages: (i) problem identification, and (ii) the

²⁷¹ Department of Health for Scotland. *Report of the Committee on Building Legislation in Scotland* (HMSO, October 1957), 70.

²⁷² P. Slovic, “Perception of Risk,” *Science* 236: 4799 (1987).

²⁷³ Peter Isaacson, “Pollutant Regulation and Public Sensibility,” *Environmental Impact Assessment Review* 6 (1986): 231.

identification and estimation of the costs and benefits of alternative approaches to addressing the problem. Problem identification has a number of parts: what is the root cause of the problem, how big is the problem, and who is affected? Similarly, cost-benefit analysis ideally should contain quantitative and qualitative assessments of impacts and where they fall, and the risk analysis should contain estimates of probability in relation to the size of the problem.

Consultation is a requirement of cost-benefit and risk analysis, and one objective of consultation is to populate the analysis with quantitative or, more commonly, qualitative data, sourced from those who are affected by the problem or will be affected by any of the solutions that are being contemplated. Views are also usually sought on possible solutions. Nonexperts are an important source of information because they have specific information on how something does or might affect them. In this regard I would characterise nonexperts as a source of data on which others exercise judgment.

Nonexperts as a source of information on acceptable risk

This role requires analysts to ask nonexperts what they think as well as what they know, and to have regard to the judgment of nonexperts as authoritative sources of advice and information on acceptable risk. The ability of nonexperts to fulfil this role is reflected in the quote from Slovic above, and also Fiorino's argument against a 'technocratic' orientation in decision-making: '... lay judgements about risk are as sound or more so than those of experts. Nonexperts see problems, issues, and solutions that experts miss.'²⁷⁴

Nonexperts contribute in this way because: (i) the judgment that is required depends on knowledge that is not specialist technical knowledge but is part of the experience set of nonexperts, and (ii) not only do experts not have such knowledge, but they are also blinkered by what they do know. Their experience and techniques take them in a direction that does not

²⁷⁴ Daniel J. Fiorino, "Citizen Participation and Environmental Risk: A Survey of Institutional Mechanisms," *Science, Technology and Human Values* 15: 2 (April 1990): 227.

reflect commonsense, and nonexperts who are not so constrained are able to see the wood as well as the trees.

However, knowledge provided by nonexperts on acceptable risk is still an input into a judgment that is exercised by others, and this judgment takes into account factors that are beyond the ken of the non-expert, such as the broader or spill-over costs and benefits of an action.

Nonexperts as experts

One view is that nonexperts can in fact be experts in specialist technical areas. While at risk of reading too much into Brown, I note his observation that that: ‘Popular epidemiology involves scientific, medical, and public health experts in varying degrees, but always in alliance with citizen activists. Lay people can learn to utilise expert knowledge and acquire some of those skills themselves.’²⁷⁵ It might also be argued that someone who has spent much of their life working with certain disadvantaged groups in society in a voluntary capacity and without formal training could be described as having specialist knowledge.

Nonexperts as a source of wisdom

I don’t doubt that nonexperts can be wise. The question is whether their wisdom is relevant and can be applied in technically complex domains that arise in performance-based regulatory regimes. The two attributes of wisdom I discussed earlier were a capacity to evaluate and ability to discern and promote value. The former was associated with a wisdom-specific domain described as the ‘pragmatics of life’.

The clearest statement I have found of the role of nonexperts as a potential source of wisdom in technically complex domains comes from Isaacson:

²⁷⁵ Phil Brown, "Popular Epidemiology: Community Response to Toxic Waste-Induced Disease in Woburn, Massachusetts," *Science, Technology and Human Values* 12(3-4), 1987: 83.

The criteria of judgment are conceptually quite simple and depend on logical rules of long standing. No one need possess a PhD in chemistry or biological science to either understand or use them. The importance of these criteria shapes the role science, as we think of it, plays in the regulatory process. Science may provide data, but the significance of the data as a basis for regulatory action needs minds that are capable of logical thinking.²⁷⁶

Establishing a link to wisdom requires Isaacson's 'logical thinking' to equate to an evaluative capacity, but I consider it plausible to make this link. The role of nonexperts as a discerners and promoter of value is less clear in the regulatory literature, even though it can be inferred in observations such as: '... disputes are "inherently value-laden" and can be resolved only by "mixing together experts and generalists and forcing continuous dialogue among them"'.²⁷⁷

Non-judgment reasons for public participation

For completeness I note that there are other reasons why nonexperts are involved in technical rule-making. The first has a normative dimension and is based on the idea that, in a democratic society, citizens should have a right to participate in decisions on matters which affect them, and through participation they develop trust in government and an understanding of their own responsibilities as citizens. This is reflected in Hood's description of an: '... egalitarian' risk regulation regime, where the preferred policy instrument is: 'local participatory institutions, forums, citizens juries'.²⁷⁸ Associated with this but introducing a positive element, participants by citizens can:

²⁷⁶ Peter Isaacson, "Pollutant Regulation and Public Sensibility," *Environmental Impact Assessment Review* 6 (1986): 230.

²⁷⁷ Daniel J. Fiorino, "Environmental Risk and Democratic Process: A Critical Review," *Columbia Journal of Environmental Law* 14: 2 (1989): 509, quoting Brooks.

²⁷⁸ Hood, Christopher Hood, Henry Rothstein, and Robert Baldwin, *The Government of Risk: Understanding Risk Regulation Regimes* (Oxford: Oxford University Press, 2001), 13.

1. Act as a check on the exercise of power by public authorities. This check comes from transparency through consultation and other forms of public disclosure ('daylight is the best disinfectant').
2. Act as a balance against organised interests. Public choice theory tells us that those in society that are most affected by something (where the costs or benefits are most concentrated) and are better organised, are likely to have a disproportionate influence on political decision-makers and hence outcomes. However, these may not be the best outcomes in terms of overall community welfare. Opening up participation in the decision-making process can help mitigate this effect.

Finally, one of the reasons for lower than expected levels of compliance with the law is that legal requirements are either or both not understood, or the underlying objectives of the law are not supported. If the regulated sector knows what is expected of it, and agrees with the reasons for the law, then this will enhance both its capacity and willingness to comply. One way of ensuring that there is the necessary information and understanding is to involve the regulated sector in the design of the law and the analytical processes. This general principle extends beyond the regulated sector. If the beneficiaries of the law have a good understanding of what it requires then they are in stronger position to hold regulated entities to account. If they have been involved in the development of the law and understand the rationale, including the judgments that were made in selecting the particular approach that was ultimately adopted, they are more likely to accept its legitimacy.

Conclusion

It is clear that nonexperts contribute to the exercise of judgment through providing data and knowledge, and both have a right to be consulted, and should be consulted because this leads to better regulatory outcomes. However, a case can also be made that nonexperts can in fact be experts in important areas that are associated with wisdom; specifically procedural knowledge and 'life experience'. Nonexperts can also contribute wisdom (as no doubt can experts) where they have capability to discern and promote what is of value to the community.

Aggregating knowledge

The focus of this chapter has been on the attributes of individuals, but there also needs to be a process of aggregating knowledge. This assertion is based on the assumption that in complex decision-making contexts no single individual has all of the information required. How best to aggregate knowledge in complex decision-making contexts is beyond the scope of this thesis, and I will identify decision-making in my conclusion as a promising area for further research. It remains in this chapter to highlight what the features of a decision-making environment might be.

A key feature is likely to be some form of coordinating mechanism that brings together what is known, what is capable of being known through sharing pockets of knowledge, and wisdom which has the effect of assigning a community value to the body of knowledge as a whole. Whatever mechanism is chosen it needs to be proportionate to the judgment that needs to be made, as represented in Figure 11.

Figure 11: Decision-making under uncertainty (version 2)

Standards committees that comply with international norms have many of the features that are associated with good decision-making in complex technical areas whether there is a broad community interest. They are representative of the community and aim to achieve a balance

of interests. They include relevant expertise, with selection on the basis of professional and community standing. They consult and deliberate and take decisions by consensus.

However, as noted in chapter 5, judgments by standards committees have traditionally tended towards conservatism, whereas significantly pushing out the technology threshold requires a radical decision-making norm. It may be possible to adapt standards committees to facilitate a more radical approach, but this is not just a matter of changing decision-making norms but also reconfiguring the composition of committees so that higher levels of technical expertise, and wisdom, are applied in situations where the social content of the decision is high. In other words, group decision-making does not remove the need to populate such groups with people with the right attributes; groups are unlikely to be expert or wise if there is no expertise or wisdom in the groups.

I take this view notwithstanding Surowiecki's popular *Wisdom of Crowds* (2004), which argues that under certain conditions large groups of people each with small pockets of knowledge can bring that knowledge together in a way that forms a collective, and accurate, whole. However, Surowiecki acknowledges the need for experts ('well-informed, sophisticated analysts') in certain circumstances, so long as their knowledge is pooled with that of others.²⁷⁹

Sunstein has also written on the wisdom of groups in *Infotopia: how many minds produce knowledge* (2006). While acknowledging that groups can aggregate dispersed knowledge, he also cautions that decision-making within groups can be subject to a number of errors:

It is tempting to think that if many people believe something, there is good reason to assume that they are right. How can many people be wrong? One of my main goals has been to answer that question. People influence one another, and the errors of a few can turn into the errors of the many. Sometimes large groups live in information cocoons. Sometimes diverse people end up occupying echo chambers simply because of social

²⁷⁹ James Surowiecki, *The Wisdom of Crowds. Why the Many are Smarter than the Few and How Collective Wisdom Shapes Business, Economies, Societies, and Nations* (London: Little, Brown, 2004), 34.

dynamics. Governments no less than educational institutions and businesses fail as a result.²⁸⁰

My thesis is that there are individuals with certain attributes that make them more likely to be right than wrong, and who do not live in information cocoons. It seems to me that involving these individuals in groups, along with others who contribute knowledge and informed by consultation with those outside the group and deliberation within the group, is most likely to create the conditions for good decision-making.

An alternative or complementary approach to group decision-making is to create a hierarchical decision-making process, with expertise and wisdom represented at the peak. The advantage of this approach is that it can permit more control to be exercised over who the decision-makers are than in a largely devolved selection process represented by standards committees. The approach was debated extensively in the United States in the 1970's in response to proposals for a 'science court', albeit in the context of resolving scientific uncertainty in controversial areas such as nuclear energy and fluorocarbons in the stratosphere, rather than creating an expert body to decide on questions of acceptable risk.²⁸¹ The Science Court proposal was in fact criticised because it was seen to separate questions of scientific uncertainty (about risks and consequences) from policy choices (about what is an 'acceptable risk').²⁸²

Another option is to elevate decision-making to parliament. The case for doing so is that decisions on acceptable risk are inherently policy choices and as such: (i) should be made by

²⁸⁰ Cass R. Sunstein, *Infotopia: How Many Minds Produce Knowledge* (New York: Oxford University Press, 2006), 218.

²⁸¹ See Nancy Ellen Abrams and R. Stephen Berry, "Mediation: A Better Alternative To Science Courts." *Bulletin of the Atomic Scientists*. (April 1977; D. Nelkin and M. Pollak, "Public Participation in Technological Decisions: Reality or Grand Illusion?" *Technology Review* 81: 8 (1979).

²⁸² Albert R. Matheny and Bruce A. Williams, "Scientific Disputes and Adversary Procedures in Policy-making," *Law and Policy* 3: 3 (1981), 345.

elected representatives as this is required in democratic systems of government,²⁸³ and (ii) parliament is capable of making good choices when there is more than one right answer, given its representative nature and decision-making by deliberation.²⁸⁴

The constraint is that, based on my analysis, democratic and court-based decision-making institutions will not in themselves produce the best answer, unless they involve both technical and wisdom-relevant expertise. In addition, it would seem impractical to establish a political or court-based process for every technical decision that needs to be made where there is a significant social content, primarily because of the sheer volume.

On balance, my hunch is that the most viable institutions will take the form of ‘communities of public interest’, of which standards committees are one form. Such communities would need to satisfy four main criteria: (i) participation must be on the basis of the attributes of individuals rather than representation of particular interests (ii) the entry criteria must be high, given my conclusions of expertise and wisdom (iii) they must be open to and actively seek external sources of knowledge, and (iv) they must appreciate that their role is to push out the boundaries of technology as far as possible, while maintaining the risks within boundaries that, in their judgment, are tolerable. I don’t doubt that such communities of interest exist, and identifying and analysing them should provide useful insights into how best to apply both technical expertise and wisdom in practical settings.

Conclusion

This chapter examined the idea that engaging experts in decision-making in situations of uncertainty is a feasible strategy for pushing out the boundaries of technology in performance-based regulatory regimes. Underlying this question is an assumption that the counterfactual to

²⁸³ See Legislation Advisory Committee. *Guidelines on Process and Content of Legislation*. 2001 edition and amendments. Can be found at <http://www.justice.govt.nz/lac/index.html>, 194, section 10.1.3, reference to ‘matters of significant policy should be included in an Act’.

²⁸⁴ Jeremy Waldron, *The Dignity of Legislation* (Cambridge: Cambridge University Press, 2007).

the engagement of experts is either reversion to a traditional but conservative ‘trial and error’ approach to standards setting or taking unacceptable risks.

Sources of uncertainty were explored and I concluded that they are greater than usually emphasised in the literature, extending from commonly cited technical and community risk preferences, to impacts on trade, economic performance and legal/constitutional rights and obligations. This broadens out the scope of expertise required in the decision-making process, an observation that has been already made by some writers in the area.

Uncertainty is endemic in performance-based regulatory regimes, and while data sources and measurement and risk assessment/analytical techniques have been developed and are being enhanced, they cannot reliably predict technical performance or accurately assess what is an acceptable risk associated with new technologies in some situations. Nor are there reliable methods for assessing overall costs and benefits of introducing new technologies, taking into account the broader set of socio-economic and constitutional/legal objectives.

Relying on experts to resolve uncertainties is feasible but this is highly conditional on engaging the right sort of expert in the right situation. There is a threshold of knowledge and experience below which someone could not be regarded as an expert. Above the threshold it is necessary to differentiate between those who are proficient and able to make accurate predications in situations of uncertainty within the narrow boundaries of their specific knowledge and where are precedents, and those who have both experience and personal attributes that allow them to exercise judgment in areas of complex uncertainty where there are no precedents.

The judgment of those who are proficient or experts can be relied upon in some situations but there is a critical zone where expertise is not by itself sufficient given the magnitude of the uncertainties and the complexity of the calculation, and the consequences of making the wrong decision. Wisdom is required in such situations. The corollary is that not applying wisdom in the critical zone runs the risk of regulatory failure.

Chapter 7: The case for explicit experimentation and its limiting conditions

Background

In the previous chapter I established an argument that the quality of decision-making can be improved in situations of uncertainty arising in performance-based regulatory regimes through engaging superior expertise and wisdom. Higher quality decision-making, in effect more accurate predictions that an innovative technology will meet a broad set of regulatory objectives, allows the threshold of technology to be pushed out while maintaining the risks within boundaries acceptable to the community.

In this chapter I go one step further and argue that, notwithstanding improved decision-making, the experimental nature of innovative technologies still needs to be acknowledged. The implication of this is not just that they might fail, but how they perform can also provide important information that can inform both the innovation system and regulatory regimes, contributing to continuous improvement. The risks and consequences of failure need to be managed, but the information that is generated also needs to be captured, analysed and diffused as a contribution to knowledge.

Treating innovative technologies as experiments provides a framework for such learning. It also extends the possibility for more innovation as experimentation can create control conditions which manage the risks that would otherwise be unacceptable.

This chapter broadens out the frame within which we think about the risks of performance-based regulation and how they can be managed. The core literature on performance-based regulation focuses for the most part on standards-setting, approvals and compliance. It does not significantly address the management of risks of failure of innovative technologies ‘in-market’, or how such management might be deployed to capture more of the normative benefits of performance-based regulation.

Introduction

An innovative technology is placed on the market following a judgment by the regulator that, taking all things into account, it is likely to meet mandatory performance requirements. That is not the end of the matter. Such judgments are inevitably bounded by the state of the science, the knowledge and preferences of those exercising the judgment, and the impossibility of being able to anticipate every possible circumstance which will test the efficacy of the technology. Such circumstances include the conditions of manufacture, construction, assembly, use and maintenance, and as such can be sensitive to skill levels, motivation and human error. They also include environmental conditions such as weather and terrain. It is worth recalling that many of these factors were in play in the leaky building crisis. The proximate causes of buildings failing were a combination of monolithic cladding systems, untreated timber, Mediterranean-style house designs, weather conditions and workmanship. Efficacy over time was also dependent on the knowledge and motivation of home owners to take a disciplined approach to maintenance. Some but not all of these factors may have been foreseen. This has led to the observation that every new building is: ‘... a prototype, or at least a one-off construction, with all the consequences that this implies.’²⁸⁵

While the degree to which innovative technologies will be sensitive to such conditions will vary, the point is well made that conceptually innovative technologies could be thought of as prototypes and hence experimental until such time as they are proven or otherwise in the conditions in which they are used.

By way of illustration, reference can be made to the aftermath of the leaky building crisis. In the light of experience with ‘prototype’ Mediterranean-style, monolithic-clad, untreated framing buildings, lessons were learnt and various new approaches were standardised, including requiring treated timber for framing in high-risk areas and a cavity behind the cladding to provide additional lines of defence in the event that a building leaks. Consenting

²⁸⁵G. Van Eck et al, “Inherent Defect Insurance” (paper presented to the International Association of Engineering Insurers (IMIA) Conference (IMIA WGP14 (01)E), Sydney, Australia, September 2001), 6.

and inspection protocols were also modified to intensify scrutiny of areas of vulnerability. Part and parcel of this was effectively prohibiting certain designs and materials because they were too risky.

The problem is that this was an uncontrolled experiment, and a very large number of buildings were constructed using the prototype before information was collected and evaluated and reflected in either standardised approaches or prohibitions. The consequences of the uncontrolled nature of the experiment were the economic and social costs to building owners, users and builders, a financial cost to ratepayers (because of the liability attached to territorial authorities), and a broader economic and social cost to the community as whole as a result of a deterioration of the quality of the housing stock over time. It also resulted in a more conservative building control regime, with opportunity costs associated with less innovation than might otherwise have been the case.

This introduction provides the key elements of the case for experimentation. It is based on the premise that performance-based regulation permits ‘one-off’ or prototype technologies to be placed on the market. As innovative technologies they can be thought of as experiments, in so far as efficacy has not been proven either in terms of the science, or the full range of circumstances of construction through to use and maintenance.

Given their experimental nature, innovative technologies should therefore be treated as controlled experiments; they should be subject to *ex post* monitoring, testing and evaluation, and the knowledge thus generated should be systematically applied either to curtail the experiment or standardise the technology, both to facilitate its diffusion and to provide a foundation for further innovation. Treating such innovations as experiments could be adopted as an offensive strategy, to promote innovation, and/or as defensive strategy, to manage the risks of technologies that could fail. Either strategy has the potential to permit more innovation while keeping the risks within boundaries acceptable to the community.

This chapter is constructed along the following lines. First, experimentation is discussed as a normative and practical philosophy associated with the advancement of society. Second, a

case is made for explicit experimentation as a strategy for achieving the normative benefits of performance-based regulation while managing the risks. In the course of this a number of difficulties with implementing a regulatory regime that fosters explicit experimentation are identified.

The case for experimentation

There are three arguments for treating innovative technologies as experiments. The first is a normative argument that human progress depends on experimentation. The second is that institutionalising experimentation within a performance-based regulatory regime can change the cost-benefit calculation associated with the decision to approve innovative technologies in favour of more innovation. The third is that institutionalising experimentation also institutionalises learning, thus supporting both the regulatory regime and the innovation system.

The normative argument

The idea that societies need to experiment is captured by the concept of ‘the experimental society’. This was the title of an article by Haworth in which he discusses the philosophies of John Dewey and Elijah Jordan, both exponents of the idea: ‘. . . that the political process, the process by which social affairs are ordered, should be conceived and conducted as an *experiment*’. As such: ‘. . . the whole of society might become a laboratory and every activity might be treated as an experiment’.²⁸⁶ It was also the focus of an article by Donald Campbell who conjures up: ‘. . . the imagery of an experimenting society, one that would vigorously try out possible solutions to recurrent problems and would make hard-headed, multidimensional evaluations of outcomes, and when the evaluation of one reform showed it to have been ineffective or harmful, would move on and try other alternatives.’²⁸⁷ Futurist Alvin Tofler,

²⁸⁶ Lawrence Haworth, “The Experimental Society: Dewey and Jordan,” *Ethics* 71: 1 (1960): 27.

²⁸⁷ Donald T. Campbell, “The Experimenting Society,” in *The Experimenting Society: Essays in Honor of Donald T. Campbell*, ed. William N. Dunn (Policy Studies Review Annual, Vol. 11. New Brunswick, NJ: Transaction Publishers, 1998), 37.

reflecting on the rapid change in the modern society, cautions against ‘blind acceptance nor blind resistance’, and suggests that we experiment with ‘change-regulating measures’ at the personal, technological and social levels.²⁸⁸

The philosophy has been embodied in various practical policy and operational frameworks. These include: Douglass North’s *adaptive efficiency*, which: ‘. . . concerns itself with the ability of a society to acquire knowledge, to experiment, and to creatively solve problems. It induces experiments with new methods and provides feedback mechanisms to allow for post-hoc correction of errors’;²⁸⁹ *adaptive management*, described as: ‘Experimentation to learn more about the operation of complex systems . . . [it] has the attributes of being flexible, encouraging public input, and monitoring the results of actions for the purpose of adjusting plans and trying new or revised approaches,’²⁹⁰ and *double-loop learning*, which also contains the central tenet of trying something out in situations of uncertainty, detection of errors and correction, in a way which is strongly goal orientated. It is purposeful learning which involves questioning of current assumptions and leading to new and creative ways of achieving goals, be they of the individual, institution or society as a whole.²⁹¹

The philosophy of experimentation articulated by its champions has a number of common elements. The first is that experimentation is necessary for the development, if not protection, of society. We face difficult problems, more so in the modern world, but also significant opportunities. For example, in the building area a number of factors have been identified that require: ‘. . . imaginative solutions to new technical problems and . . . new materials to meet these new demands’, including: growth of population; demand for housing, infrastructure and

²⁸⁸ Alvin Tofler, *Future Shock* (London: Pan Books Ltd. 1971), 338.

²⁸⁹ David M. Driesen, “The Economic Dynamics of Environmental Law: Cost-Benefit Analysis, Emissions Trading, and Priority-Setting,” *Boston College Environmental Affairs Law Review* 31: 3 (2004): 4.

²⁹⁰ Oregon State University, *Adaptive Management*, <http://oregonstate.edu/instruction/anth481/ectop/ecadm.html> (Accessed April 10, 2008).

²⁹¹ See Chris Argyris: Theories of action, double-loop learning and organizational learning. <http://www.infed.org/thinkers/argyris.htm> (accessed April 11, 2008).

industrial plants; land naturally suited to building has shrunk; and people expecting higher standards of comfort and safety.²⁹² Standing still is not a plausible option, but we cannot be certain of the effects in the future of the actions that we take today. Experimentation allows us to try things out, thus extending the set of possibilities of getting it right.

The second is that experimentation is both planned and purposeful. We are clear about our goals and create the conditions that allow experimentation to flourish. The third is that experimentation is inclusive; it involves and in effect is done with the consent of the community. The fourth is that it is rigorous. Reference is made to the scientific method, being evidence-based, logical and open to contesting ideas, with decisions ultimately being taken by consensus. The fifth is that it provides for the diffusion of the learning from experiments. The sixth element is that there is an ability to modify or terminate experiments based on results. Implicit in this is the idea that failed experiments should involve minimum harm.

The philosophical argument has been made in a wide range of contexts, from federalism (which permits experimentation at the state level), through to policy experiments and experiments with innovative technologies.

The rational calculation argument

The rational calculation argument derives from the fact that our point of reference is innovative technologies for which a claim is made that they meet mandatory performance requirements. A regulator must take a decision on whether these technologies should be approved, typically on the basis of a ‘reasonable grounds’ test. Implicit in this is a cost-benefit calculation by the regulator that takes into account not just the reliability of the scientific knowledge that can be used to predict performance, but also the consequences of the technology failing to meet the performance requirements in the field. For example, the judgment might be that the technology cannot afford to fail, say in the case of the new

²⁹² G. Van Eck et al, “Inherent defect Insurance” (paper presented to the International Association of Engineering Insurers (IMIA) Conference (IMIA WGP14 (01)E), Sydney, Australia, September 2001), 5.

Airbus380, and hence the regulator will be demanding a very high level of proof that it is reliable (a ‘can’t afford to fail’ heuristic). Alternatively, the regulator could assess that the consequences of a failure are relatively low, and may be prepared to accommodate a lower level of proof.

Treating innovative technologies as experiments can change the calculation of costs by the regulator, making it more likely to approve desirable technologies in certain situations than would be the case if there was no framework for experimentation. For example, the regulator might judge that while a risk of failure exists because a technology has not been proven in all the possible circumstances of use, close monitoring will detect problems at an early stage and remedial action will be able to mitigate the harm. This calculation could be implicit or explicit, and may derive from how the regulator *frames* the decision.

Framing is based on the idea that when presented with a choice, regulators (as decision-makers) will be influenced by how it is presented. Assume a preference in favour of innovation but at the same time personal or institutional risk aversion. Framing the decision to approve an innovative technology in a way that acknowledges that while there is a risk it can be managed, may elicit a positive decision relative to a situation where the risk is emphasised but the risk management strategy is not. Decisions that are framed by reference to experimentation as a risk management strategy may also assist the regulator to persuade stakeholders to be supportive on the basis of a communications strategy that has three key messages: (i) experimentation is preferable to the extant regulatory approach (ii) the risks of experimentation are able to be managed, and (iii) stakeholders will be directly involved in the conduct of the experiment.²⁹³

²⁹³ For a discussion on framing new approaches to US environmental policy which involve experimentation see: David Laws and Ian J. Finlayson. “Reframing Regulation: Changing Forms of Law and Practice in U.S. Environmental Policy.” The Environmental Technology and Public Policy Program. Department of Urban Studies and Planning, Massachusetts Institute of Technology. October 12, 2004.

The learning argument

Performance-based regulatory regimes increase the likelihood that innovative technologies will be put on the market. They also increase the likelihood that innovations will significantly push out the boundaries of current knowledge and experience, thus increasing the risk of failure. In effect, in such regimes there are more experiments and more risky experiments.

It is axiomatic that such regimes need to provide for feedback loops, codification of learning and knowledge-diffusion mechanisms. These are internalised in traditional ‘trial and error’ standards-based regulatory regimes, and need to be rebuilt in performance-based regimes. However, performance-based regimes are also more demanding in this regard than standards-based regimes. This is reflected in the following observation by Brannigan & Kilpatrick:

The very slow pace of innovation in building technology and conservatism on the part of builders meant that unexpected building disasters were rare. Tombstone regulation (imposing new requirements after a disaster) tended to be adequate. However ‘performance based’ regulation creates an entirely new building environment, since every design can be ‘one off’.²⁹⁴

In essence, we must anticipate and prepare for more frequent failures, and hence performance-based regimes need to be proactive in the collection and analysis of information on the performance of innovative technologies, and in the codification, diffusion and application of the knowledge that is generated, over the life of the technology. Brannigan & Kilpatrick describe this as: ‘. . . effective “cradle to grave” control over the regulated product’.²⁹⁵ This requires effective management of the interface between those who are involved in the

²⁹⁴ Vincent Brannigan and Anthony Kilpatrick, *Requirements for the Legal Interface between Performance Based Design and Performance Based Safety Regulation* (Paper presented at the Construction and Building Conference of the Royal Institution of Chartered Surveyors. London: UK, September 7-8, 2006).

²⁹⁵ *Ibid.*

production, implementation and use of innovative technologies, science and standards bodies, and regulators.

Summary

There is a normative argument for experimentation based on the need to try out new ways of doing things to address current and emerging challenges to societal goals and values (the counterfactual being a diminishing of what we regard as of value, such as the quality of the environment or personal health and safety), and to advance such goals and values to make us better off relative to where we are today. This normative argument is based on a perspective that society and the interaction between society and the physical environment is materially more complex today than in the past, and the best way to manage complexity is through experimentation. In this context performance-based regulation is an important tool for pursuing experimentation, as it is permissive of innovative technologies being accepted for use by society.

There are also practical arguments for treating innovative technologies as experiments within the framework of a regulatory regime. The first is that it might increase the appetite of regulators for risk-taking, as experimentation as a concept enables them to rationalise the decision to approve an innovative technology on the basis that the risks are known but able to be managed, and to persuade others on the same basis. The second is that treating innovative technologies as experiments may help build a consensus for, and provide the construct of, formal processes for learning based on performance over the life of such technologies.

Contrast this with a situation where there is not this consensus. Innovative technologies are not expected to fail making failure, when it does occur, an unwelcome surprise, and inviting a response which involves taking a more conservative approach in future. And because the regime is not sensitised to the risk of failure, there is no commitment both to comprehensive monitoring and feedback by all of those participants in the regime who might have some insight into how the technology is performing over time, or to acting on information which is

provided, in a timely manner. There is an empirical basis for this scenario as it accurately describes the features of the leaky building crisis.

Forms of experimentation

Introduction

From a general reading of the literature I have identified four alternative approaches to experimentation: (i) a market-based approach, which relies on competitive forces underpinned by insurance as a safety net and *de facto* regulatory discipline (ii) reliance on informal experts-driven experimentation, which offers a structured process for learning from rare events that test the limits of innovative technologies (iii) reliance on informal regulator-driven experimentation which offers a structured process of monitoring and feedback loops and a responsive mechanism for interpreting and applying the information that results, and (iv) explicit regulator-conducted experimentation.

All four approaches could be purposeful, to the extent that they may reflect a conscious decision to experiment, although with varying degrees of formality and transparency. In the following sections I assess each of these approaches against three outcomes that can be derived from the arguments for experimentation. Will the approach result in a propensity or preference for experimentation (a widely held ‘experimentation’ heuristic)? Will the approach allow the risks to be managed? Will the approach result in managed learning?

A market-based approach

The market provides a regime for experimentation. Motivated by the desire to make a profit, individuals and firms develop new products and services and offer these to consumers. Consumers make their choices based on the attributes of competing products and services, and those which best meet their needs and expectations succeed. A framework of rules creates incentives for experimentation. For example, competition law reduces barriers to entry to markets, thus permitting new entrants to compete with incumbents, leading to new products

and services from new entrants but also incentivising incumbents to innovate to protect their competitive position. Intellectual property laws provide monopoly rights to reward individuals and firms who invest in innovation, but limit these rights to permit diffusion of knowledge and competition from imitators and innovators. Consumer laws prevent misleading and deceptive claims about new products and services, thus ensuring that consumers are well informed.

Thus the market is a primary driver and source of experimentation, but it cannot be relied upon where there are important community values such as health, safety or environmental protection. Intervention by the state to protect such values through the setting of mandatory standards is, for the most part, justified on the basis that there is a market failure as consumers are not able to assess critical attributes of products and services (the likelihood that a building will leak and rot over time) either at the point of purchase or for some time afterwards. Therefore consumers are not exercising an effective market discipline on producers, with potentially adverse consequences for them personally and the community as a whole. Even strong advocates of market disciplines such as F. A. Hayek acknowledge that the state must intervene in such situations.²⁹⁶

Insurance is a market response to risk and as such could facilitate experimentation through risk spreading and providing compensation in the event of failure. The state could either mandate that those who are experimenting, or experimented on, obtain insurance, or could directly provide insurance. However, in order to manage their risks, insurers may impose standards on insured entities that are higher than regulated standards, thus inhibiting rather than enhancing the environment for experimentation. Insurers may also decide that the risks are excessive and withdraw from the market.²⁹⁷ In addition, where there is experimentation this approach does not provide an assurance that the risks of failure will be managed, or a mechanism for structured learning.

²⁹⁶ Bruce Caldwell, *Hayek's Challenge: an Intellectual Biography of F. A. Hayek* (Chicago: University of Chicago Press, 2004), 291.

²⁹⁷ For a discussion on insurance in risk regulation settings see: Neil Gunningham, Peter N. Grabosky, and Darren Sinclair, *Smart Regulation: Designing Environmental Policy* (Oxford and New York: Oxford University Press, 1998), 118-120.

Informal experimentation – experts-driven

The experimental nature of innovative technologies has for a long time been recognised by experts in certain areas, and reflected in strategies to learn from how such technologies perform ‘in-market’, such as learning from incidents that test such technologies in extreme situations. For example, a major earthquake that causes damage to structures will attract the attention of seismic engineers from around the world as this provides valuable empirical information on how structures that were predicted to perform actually perform in practice. Engineers will visit the site and report their findings at conferences and in technical journals, and where appropriate methodologies and standards will be modified to reflect the new knowledge.

Fire safety engineering provides an example of an area where a systematic approach to learning has been adopted. This includes developing scenarios drawing on new knowledge emerging from failures to predict how new structures might perform under a variety of physical and human (behavioural) conditions, with performance measured against a broad range of community goals. The ‘epistemic community’ of those engaged in this process has also broadening out to include regulatory, legal, public policy and behavioural expertise, and in at least one case the fire safety community, broadly defined, has been formed into a network and been given a government imprimatur.²⁹⁸

These examples illustrate that while such experimentation is ‘informal’, in the sense of not having been formally set up as experiments, it can nonetheless be embedded within an experts-based learning system that is both responsive and institutionalised. Experts acknowledge that innovative designs are based on predicted performance that will ultimately be tested by actual events. They plan to take advantage of such events if and when they occur; and they have established institutions to analyse and diffuse what they learn.

²⁹⁸ See: European Thematic Network Fire in Tunnels. General Report. Brussels, Belgium. <http://www.etnfit.net> (Accessed March 30, 2006).

This is not done in every field. In fact it appears to be most common in those areas where there is a professional organisation with a tradition of learning in situations of significant technical uncertainty such as structural or fire safety engineering.²⁹⁹ However, performance-based regulation takes innovation into new areas where both the institutions and the culture of learning do not exist, such as domestic dwellings in the case of New Zealand. In areas where there is not a tradition the necessary institutions may need to be created as they may not emerge on their own volition or within the timeframes required if experimentation was to be relied upon.

There are other issues with informal experimentation. While embedded in an experts-based learning system, this is no guarantee that it is equally embedded within the regulatory regime as a whole, and hence may not influence judgments by regulators in relation to regulatory approvals. The objective of structured learning may also not be achieved, as an experts-driven approach runs the risk of being technically-orientated whereas a broader set of expertise and wisdom is required to make socio-technical judgments. Finally, experts-driven experimentation is forward looking, in the sense of aiming to improve the capacity to make better decisions in the future, but the criteria I have established requires the risks of failure based on past decisions to be managed.

Informal experimentation – regulator-driven

Regulator-driven informal experimentation is the process whereby an innovative technology is approved with unlimited release. Performance is monitored and regulatory action is able to be taken in the event of failure or where failure is foreshadowed by the indicators of performance. Clearly regulators carry out these functions from an enforcement perspective. The connection to experimentation comes when the regulator implicitly or explicitly acknowledges that the performance of approved technologies ‘in-market’ is uncertain, and the purpose of monitoring is to keep performance under review as part of a risk management and learning strategy.

²⁹⁹ See Greg C. Foliente, “Developments in Performance-Based Building Codes and Standards,” *Forest Publications Journal* 50: 7/8 (2000): 9.

Regulators may establish monitoring and feedback loops and a responsive mechanism for interpreting and applying the information because: (i) they have an explicit statutory obligation to do so (ii) they have implicit statutory obligation to do so, or (iii) the statute is silent but they have discretion to do so.

An explicit obligation: This can be illustrated by reference to a principles-based regulatory regime, namely the regulation of securities markets in New Zealand. The Securities Commission has, as two of its statutory functions, the obligation to keep both market practice and the law under review. The Commission is able to respond to what it discovers through advice to government (in relation the operation of the law), by regulating certain activities, and by issuing public reports.

An implicit obligation: This can be illustrated by reference to the Building Act 2004. The Act has a number of provisions that are based on the assumption that, notwithstanding *ex ante* approvals of innovative technologies, they may not perform as predicted. For example, it contains an implicit obligation on the regulator to monitor the building sciences and industry practice by virtue of the fact that the regulator is required to ‘monitor current and emerging trends in building design, building technologies, and other factors that may affect . . . the building code and compliance documents’.³⁰⁰ The Act also gives the regulator the authority to issue warnings about, or ban the use of, building methods or products, if they have resulted or are likely to result in buildings or building work failing to comply with the building code.³⁰¹

An exercise in discretion: There are two principal reasons why a regulator may exercise its discretion even if its mandate is silent. It may arise out of the regulator’s knowledge and professionalism. For example, the regulator may have a good appreciation of scientific uncertainty and a strong ‘felt’ obligation to address it through appropriate regulatory policies and practices. Alternatively, it may arise because the regulator knows that if there is a failure

³⁰⁰ Building Act 2004, s.169(1)

³⁰¹ *Ibid.*: s.26

it will be called to account to demonstrate that it had taken all reasonable steps to anticipate and mitigate the risk of failure.

In summary, regulators may put in place mechanisms that we associate with experimentation, such as monitoring innovative technologies and responding based on actual performance. Some regulatory regimes may make this an explicit or implicit part of the mandate of the regulator. However, if the experimental nature of an innovative technology is not explicitly acknowledged at the time the approval is made, it is hard to see how this could meaningfully be taken into account in the cost-benefit calculation. It is also unlikely that stakeholders will be sensitised to the risk of failure and hence active contributors to the knowledge system that is required to identify and manage risks, as well as build the foundation for further innovation.

Explicit experimentation - overview

Explicit experimentation describes a process where an innovative technology is approved but with conditions attached. Performance is monitored, results are evaluated, and the knowledge gained is codified and diffused, with remedial action taken if there is an actual or prospective failure. The experimentation heuristic is deeply embedded in the regulatory regime.

This approach is common in some areas, and a recent policy innovation in others. The common category includes pharmaceuticals and surgical procedures.³⁰² Pharmaceutical testing can include trials involving people, which can be construed as ‘in-market’ experimentation involving relatively small groups. Surgical procedures involve experimentation because of the uniqueness of each patient, as noted by King:

Surgical innovation is the norm rather than the exception, in part for historical and cultural reasons - that is, surgery is in some respects different from the rest of medicine - and in

³⁰² For example, in the pharmaceutical area see: Michael A. Friedman, “What Is the Value of an FDA Approval in a Judicial Matter?” *Journal of Law and Policy* 12 (2004), and in the surgical area see: Nancy M. P. King, “The Line Between Clinical Innovation and Human Experimentation.” *Seton Hall Law Review* 32 (2002).

part because technical innovation is closely related to the improvisation that is expected when surgeons must address the unique anatomy of an individual patient.³⁰³

Where experimentation is common, formal methods and protocols have been established along with oversight organisations that ensure the experimentation is kept within acceptable boundaries.

Experimentation as an explicit strategy is starting to emerge in non-traditional areas. A particularly important case for my thesis is provided by programmes to experiment in the environmental standards area in the United States. These programmes gave state regulators the discretion to approve alternative ways of meeting environmental targets such as emissions. While at one level this is akin to a regulator approving an alternative solution within the framework of a building control regime, what made these programmes distinctive, and of value in terms of studying experimentation, is that: (i) the alternative solutions were formally regarded as experiments (ii) the programmes were based on the idea that experimentation should be promoted, and (iii) the programmes have been formally evaluated.³⁰⁴

Explicit experimentation in the United States

Background

Environmental regulation in the United States has been described as command and control, prescriptive and very detailed.³⁰⁵ While this approach was seen as a good starting point in regulating for environmental outcomes, over time it was widely perceived as imposing

³⁰³ Nancy M. P. King, “The Line Between Clinical Innovation and Human Experimentation.” *Seton Hall Law Review* 32 (2002): 574.

³⁰⁴ For formal reviews see: Minnesota Pollution Control Agency, *1998 Project XL Report to the Minnesota Legislature* (Minnesota Pollution Control Agency, January 9, 1998); United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002). There has also been research on the performance of the programmes, and I have drawn on this research as well as the formal reviews.

³⁰⁵ See Minnesota Pollution Control Agency, *1998 Project XL Report to the Minnesota Legislature* (Minnesota Pollution Control Agency, January 9, 1998), 2-3.

unnecessary costs on business and constraining innovative approaches to achieving better environmental outcomes. These concerns led to an initiative in the Clinton era to adopt a regulatory approach based on performance-based standards, greater collaboration between environmental regulators and regulated entities, and more discretion to regulators to approve proposals from regulated entities to achieve better than mandated environmental outcomes through departing from prescribed approaches. This was described as the ‘Alternative Path’.

Project XL

The flagship initiative was called Project XL. Commencing in 1995, this programme gave regulatory discretion to the States, but within a framework provided by the Federal Environmental Protection Agency (EPA). The initial Project XL projects were described as ‘experiments’ in environmental regulation.³⁰⁶

Project XL was not regarded as a success, insofar as the projects undertaken pursuant to this programme were not considered ‘transformative’.³⁰⁷ At the time the particular problem identified by the States was that the experimental nature of alternative approaches to achieving environmental outcomes was not reflected in the rules of the game set by the EPA. What the EPA required was a *guarantee* that projects would achieve environmental performance superior to that which a regulated firm was currently achieving. In other words the experiments could not fail. The effect of this was described as returning ‘. . . the “command and control” structure to the permit, greatly limiting the amount of flexibility, increasing regulatory burden costs, and eliminating much of the original innovation.’³⁰⁸ However, as discussed later, EPA’s approach reflected deeper problems.

³⁰⁶ Minnesota Pollution Control Agency, *1998 Project XL Report to the Minnesota Legislature* (Minnesota Pollution Control Agency, January 9, 1998), 2.

³⁰⁷ Paddock, L. Notes from the Editor: Mainstreaming Leadership Programs. *Innovation, Management Systems and Trading Committee Newsletter* 5, no.2, August 2005:2

³⁰⁸ Minnesota Pollution Control Agency, *1998 Project XL Report to the Minnesota Legislature* (Minnesota Pollution Control Agency, January 9, 1998), 8.

Joint EPA/State Agreement to Pursue Regulatory Innovation

The Joint EPA/State Agreement to Pursue Regulatory Innovation commenced in 1998. It was a reaction to the perceived failings of other approaches to facilitating innovation, including Project XL.³⁰⁹ It provided a formal framework for States to submit innovative projects to the EPA for approval and, importantly, a set of principles that, *inter alia*, acknowledged that experiments could fail:

Experimentation: Innovation involves change, new ideas, experimentation and some risk of failure. Experiments that will help us achieve environmental goals in better ways are worth pursuing when success is clearly defined, costs are reasonable, and environmental and public health protections are maintained.³¹⁰ (my underlining)

Recent Developments

New approaches in the US are building on the experiences with the ‘Alternative Path’. At the Federal level the State Innovation Grant Program, which aims to, *inter alia*; ‘. . . foster a more “innovation-friendly” culture and management systems’³¹¹ commenced in 2002. An example at the State level is the Green Tier Program initiated by Wisconsin, the legal framework for which is provided by the 2003 Wisconsin Act 276. The regulatory regime established by this Act aims to improve the value proposition for both firms who implement environmental management systems, for example through waiving certain regulatory requirements and reduced regulator oversight, and regulators, through allowing them to use their resources more efficiently. The Act specifically provides for experimentation: ‘In administering the program, the department shall attempt to do all of the following Implement an evaluation system

³⁰⁹ United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002), 9.

³¹⁰ Joint EPA/State Agreement to Pursue Regulatory Innovation. [Federal Register: May 5, 1998 (Volume 63, Number 86)] <http://www.epa.gov/EPA-GENERAL/1998/May/Day-05/g11799.htm> (accessed April 16, 2008).

³¹¹ United States Environmental Protection Agency. <http://www.epa.gov/innovation/stategrants/basicinformation.htm> (Accessed March 18, 2008).

that provides for flexibility and affords some protection for experimentation by participants that use innovative techniques to try to achieve superior environmental performance.’³¹²

Experience with explicit experimentation in the United States

For more than a decade the United States has been experimenting with explicit experimentation as part and parcel of a shift from prescriptive to performance-based regulation. This experience has revealed some significant hurdles to explicit experimentation, but in doing so has also pointed in the direction of strategies that could be put in place to overcome them. Of particular importance are: the need for the regulator to have an explicit mandate to experiment; internal alignment with the mandate; and effective engagement with external stakeholders.

Mandate

Regulators operate within the boundaries of their mandate, and hence mandate design is likely to be critical to how regulators perform in relation to certain objectives, as noted by May:³¹³

Subject to these methodological and theoretical caveats, the findings reported here suggest that careful attention to mandate design can make a difference in enhancing implementation efforts and to a lesser extent in shaping regulatory styles As mandates become more complex, it is crucial that strong signals be sent about implementation expectations through the specification of relevant mandate features.

The EPA provides an example of a regulator that had the responsibility for overseeing programmes aimed at facilitating experimentation and the discretion to approve experiments, but has been assessed as exercising its discretion more conservatively than is required to

³¹² 2003 Wisconsin Act 276, s.1(m)(j)

³¹³ Peter J. May, “Mandate Design and Implementation: Enhancing Implementation Efforts and Shaping Regulatory Styles,” *Journal of Policy Analysis and Management* 12: 4 (1993): 654.

achieve the objectives of these programmes. This conservatism has been attributed to the lack of a statutory mandate.

Why behave conservatively in the absence of a statutory mandate? Two factors seem to have been in play. The first is institutional risk. The second is institutional inertia.

Institutional risk arises when the institution judges it will be penalised for risk-taking. A general feature of the United States political economy is a suspicion that, unless constrained, regulators will apply their discretion inappropriately.³¹⁴ This means that interest groups actively scrutinise decision-making. A particular feature of most environmental laws is that that they: ‘. . . give the public and environmental groups the right to bring law suits against a government agency that fails to uphold the letter of the law [hence] EPA and states have often been reluctant to try new approaches out of concern that they end up being sued.’³¹⁵

I conclude that in the absence of a statutory mandate there are likely to be strong incentives on the regulator to act conservatively or, in other words, apply such tests to decisions that it feels will minimise the risk of being sued. These tests are most likely to be derived from what has general acceptance in a U.S. context. This is often Best Available Technology (BAT). Therefore, a statutory mandate to experiment may be required to reduce legal risk and hence remove a barrier to less conservative decision-making. It might also create a legal presumption in favour of experimentation. In other words the legal risk to the institution could arise if it does not take decisions in line with its statutory mandate.

There may also be a knock-on effect to other stakeholders who shelter under the umbrella of a legal mandate, a point made by an EPA Regional XL Coordinator: ‘Industry’s corporate

³¹⁴ see Lawrence E. Susskind and Joshua Secunda, “The Risks and Advantages of Agency Discretion: Evidence From EPA’s Project XL,” *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99), 4-5.

³¹⁵ Multi-State Working Group on Environmental Performance, University of Massachusetts Lowell and Regulatory Policy Program, Mossavar-Rahmani Center for Business and Government, John F. Kennedy School of Government, Harvard University, *Environmental Innovation: A Dialogue on the Role of Government, Law and Regulatory Approaches*, March 31, 2005. Dialogue Summary, January 2006, i.

attorneys did not consider the doctrine of administrative discretion as adequate protection of their interests [which were associated with having the flexibility to innovate]. They wanted and expected legislation, which they didn't get'.³¹⁶

However, the legal environment is but one part of the picture. Institutional norms and routines can be path dependent, and as a result can be resistant to change. While it is difficult to separate out the effects of legal risk from other factors affecting institutional inertia, the absence of a strong normative signal from a statutory mandate reduced the need to change in the case of Project XL and the Joint EPA/State Agreement to Pursue Regulatory Innovation. No doubt this was a complex effect. In the internal dialogue that took place between the two sides of the argument, one for change and the other for staying the same, the former were not able to reinforce their position by reference to the EPA's mandate. In addition, the position of external stakeholders who wanted change was also weakened in their engagement with EPA as they were not able to reference the statutory mandate.

The overall effect on the system was noted by the Government Audit Office (GAO) as follows:

Current legislation does not contain explicit language authorizing the use of innovative environmental approaches in lieu of specific regulatory requirements, and the absence of this "safe legal harbour" for EPA has been a significant obstacle to States and others in their efforts to test innovative proposals. It has also tended to reinforce the cultural resistance to innovation that EPA is seeking to change.³¹⁷

Others have argued the case for a statutory mandate. For example, in advocating legislative reform to facilitate the adoption of a new generation of environmental technology, Heaton and Banks argued in 1997 for: 'A legislative mandate that makes promotion of technological

³¹⁶ Lawrence E. Susskind and Joshua Secunda, "The Risks and Advantages of Agency Discretion: Evidence From EPA's Project XL," *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99), 20.

³¹⁷ United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002), 3-4.

innovation an explicit environmental objective’, on the basis that there were ‘. . . structural biases [in US environmental laws] against new technology’.³¹⁸ Susskind & Secunda also concluded that ‘Project XL would be well served by passage of legislation specifically defining and authorizing its implementation.’³¹⁹

EPA still does not have a clear legal mandate to facilitate experimentation, although there was an attempt to create one in 1999.³²⁰ The evidence is that this continues to act as a constraint on the institution. By way of illustration, an official in the Wisconsin Department of Natural Resources, Mary Schlaefel, reflecting on the difficulty of aligning State goals to facilitate innovation with conservatism at the EPA level, was still arguing in 2005 for a: ‘. . . right to innovate law’ which creates a safe zone where: ‘Once inside the safe zone, these parties would be empowered to use new tools, form new relationships and test new approaches that would not be possible or posed risk in the existing system.’³²¹

At the State level Wisconsin took this step, with the enactment of the 2003 Wisconsin Act 276 (also referred to in the literature as the Environmental Results Act and Green Tier law), which provides both an explicit mandate to facilitate innovation, and a mechanism to do so.

The Wisconsin Act 276 authorizes the regulator to enter into ‘charter agreements’ which form the basis of alternative approaches to meeting regulatory requirements under the ‘Green Tier’ programme. Green Tier was a finalist in the ‘best policy innovations in America’ competition sponsored by Harvard University, and has been described as a: ‘. . . “we can” law that complements the “you can’t” of command and control, using contracts, charters and

³¹⁸ G. R. Heaton and D. R. Banks, “Towards a New Generation of Environmental Technology – the Need for Legislative Reform,” *Journal of Industrial Ecology* 1: 2 (1997): 23.

³¹⁹ Lawrence E. Susskind and Joshua Secunda, “The Risks and Advantages of Agency Discretion: Evidence From EPA’s Project XL,” *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99), 22.

³²⁰ United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002), 5.

³²¹ M. W. Schlaefel, “Wisconsin’s Green Tier Leadership Program,” *Innovation, Management Systems and Trading Committee Newsletter* 5, no2, August 2005: 11.

environmental management systems as it's a main tools.'³²² In commenting on Green Tier, Laws & Amengual expanded the argument for an explicit mandate from creating the right sorts of incentives on the regulator, to providing a common purpose for all stakeholders.³²³

The experience with the Wisconsin Act provides an early indication that an explicit legal mandate to undertake experimentation can result in an environment that facilitates experimentation. The judgment of 'insiders' like Schlaefer, that such a framework is necessary, combined with the conservatism of the EPA which does not have such a mandate, gives weight to the argument.

Internal alignment

Internal alignment refers to the alignment of the organisational culture, operating principles, systems, capabilities and resourcing with the institution's mandate. Leadership and adequate resourcing emerged as issues in the US experiment.

The need for leadership

The issue of leadership was identified as a major issue in the evaluations of Project XL and the Joint EPA/State Agreement to Pursue Regulatory Innovation. There were three dimensions that indicated a lack of leadership, and hence where leadership would be required to effectively implement a new regime based on experimentation: (i) the institution needed to be accepting of risk and failure (ii) the institution needed to reward risk-takers, and (iii) the institution needed to devolve decision-making to risk-takers.

³²² Multi State Working Group on Environmental Performance. Introduction to a session on "Examples of Alternative Legal Frameworks" at the International Dialogue on Ecological Policy, the annual conference and workshop presented by the Multi-State Working Group on Environmental Performance at Madison, Wisconsin June 17-20, 2007. http://www.desertroseenv.com/MSWG2007_files/Page999.htm (accessed May 12 2009).

³²³ David Laws and Matthew Amengual. "Analysis of the Development of the Dairy Gateway and Green Tier." The Environmental Technology and Public Policy Program. Department of Urban Studies and Planning, Massachusetts Institute of Technology. September 29, 2004: 19.

The GAO evaluation wrapped up the need for leadership into a general statement on an EPA culture that was resistant to change:

State officials indicated that a long-standing EPA culture that resists alternative approaches to environmental protection is viewed as one of the most significant obstacles to state environmental innovation. The importance of cultural factors was evident in our discussions of the factors affecting progress on specific innovative proposals. Of the 20 individual proposals that the states discussed, EPA culture was cited as either the first or second most important factor in 14 cases.³²⁴

The interviews carried out by Susskind & Secunda of EPA staff in relation to Project XL were more direct. The general sentiment was that the institution had a deeply embedded cultural bias in favour of compliance with prescriptive standards and active enforcement. What was required was both ‘flexible and creative analysis’,³²⁵ and an ability for EPA staff working with the states and stakeholders to exercise discretion. Neither of these conditions was met. Rather, Susskind & Secunda concluded that: ‘EPA management never supplied an adequate mandate or resources for EPA personal working on the XL initiative.’³²⁶

There was also a need to create an internal culture that supports experimentation through positive engagement of staff. The evaluations suggest that this requires: (i) changing the attitudes of existing staff who have a commitment to the existing ways of doing things (ii) building the capability of existing staff and/or acquiring new staff with the skills and attributes that allow them to conduct or be effective partners in the conducting of experiments, and (iii) creating internal linkages so that the institution is committed to a single goal, rather than pulling in different directions.

³²⁴ United States General Accounting Office. Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs. GAO-02-268, January 2002: 19.

³²⁵ Lawrence E. Susskind and Joshua Secunda, “The Risks and Advantages of Agency Discretion: Evidence From EPA’s Project XL,” *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99), 12.

³²⁶ *Ibid.*: 22.

On attitudes the GAO noted that at the state level: ‘. . . internal staff resistance was the biggest problem, noting that many rank-and-file managers had been with the agency for 25 to 30 years and had a professional ethic that emphasized following long-standing approaches to environmental protection’³²⁷ and, at the federal level: ‘. . . what is often construed as “cultural resistance” is sometimes rooted in a sense of obligation among agency officials to ensure that statutes and agency regulations are properly and fully implemented.’³²⁸ Susskind & Secunda made reference to ‘institutional enforcement biases’ in EPA.³²⁹ Laws & Amengual discussed: ‘. . . reframing the role of a regulatory agency as simultaneously the steward of baseline commitments and an affirmative partner in promoting innovation and action.’³³⁰

Positive attributes were generally associated with having a tolerance for risk. For example, the GAO reported that: ‘One official noted that EPA staff had exhibited a “what if” mentality when reviewing proposals – developing a worst possible case scenario and holding that scenario up as a reason to reject the proposal.’³³¹ Skills were associated with entrepreneurship³³² and for staff to be ‘problem solvers, partners, and facilitators.’³³³ On internal coordination, Susskind & Secunda reported on internal confusion over what would be

³²⁷United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002), 14.

³²⁸ *Ibid.*, 15.

³²⁹ Lawrence E. Susskind and Joshua Secunda, “The Risks and Advantages of Agency Discretion: Evidence From EPA’s Project XL,” *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99), 13.

³³⁰ David Laws and Matthew Amengual. “Analysis of the Development of the Dairy Gateway and Green Tier.” The Environmental Technology and Public Policy Program. Department of Urban Studies and Planning, Massachusetts Institute of Technology. September 29, 2004: 18.

³³¹ United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002), 20.

³³² Lawrence E. Susskind and Joshua Secunda, “The Risks and Advantages of Agency Discretion: Evidence From EPA’s Project XL,” *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99), 13.

³³³ United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002), 26 - reporting EPA’s Draft Strategy on Innovating for Environmental (EPA’s own assessment of what is required based on the experience with Project XL and Joint EPA/State Agreement to Pursue Regulatory Innovation).

regarded as the ‘success’ of Project XL³³⁴ and the failure ‘. . . to organize an open, consensus-building process defining XL’s mission and to coordinate efforts to achieve the initiative’s goals.’³³⁵

The need for adequate resourcing

Both the GAO and Susskind & Secunda commented on the need for adequate resourcing. Resources can take two forms: (i) management resources dedicated to making a new programme work, and (ii) the staff and budget required to effectively implement a new programme. Resourcing means that activities can be undertaken, but they are also a signal of the importance that is placed on a particular activity.

The GAO addressed the resources issue primarily at the state level. Resource constraints were considered to be one of the most significant obstacles. In many cases the particular problem was considered to be the allocation of limited resources between a new activity and an existing and non-discretionary workload such as meeting federally-mandated requirements.³³⁶ However, the problem could also have been the level of priority attached to the new activity. A Michigan official stated that finding sufficient resources was one of the primary difficulties faced in pursuing initiatives under the EPA/ECOS agreement, but: ‘. . . the effort was given high-priority status; and therefore, agency resources were diverted to support it.’³³⁷

The fact that the GAO did not identify resourcing as a major obstacle at the federal level supports a view that addressing institutional culture (GAO’s number one concern with EPA) is a precondition to a regime change, with leadership a precondition to changing institutional culture. Susskind & Secunda, on the other hand, alluded to an interdependency between the

³³⁴ Lawrence E. Susskind and Joshua Secunda, “The Risks and Advantages of Agency Discretion: Evidence From EPA’s Project XL,” *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99), 13.

³³⁵ *Ibid.*: 15.

³³⁶ United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002), 13.

³³⁷ *Ibid.*, 13.

source of EPA's budget and its discretionary resources, noting that: 'EPA's budget is largely determined by Congress' assessment of the number of enforcement actions the Agency took'.³³⁸ In affect there could be a number of mutually reinforcing factors influencing the level of institutional commitment, including incentives to orientate its resource allocation in the direction of activities that provide the best opportunity to attract resources.

External engagement

External alignment refers to the principles, policies and procedures that should guide the regulator's engagement with external stakeholders. The principal stakeholders are: (i) those who are involved in the design and implementation of the experiment from a 'producers' perspective (ii) those who are directly impacted by the outcomes of the experiment (iii) the community as a whole (although in practice this tends to be organised interest groups, professional groups and 'politically active' citizens who feel strongly about an issue), and (iv) expert and standards bodies.

The need to build a consensus with all external stakeholders

There can be three objectives to building a consensus with external stakeholders: (i) as an offensive strategy to gain 'buy-in' from stakeholders who can add their weight to the goals through active support (ii) as a defensive strategy to engage stakeholders who would otherwise actively advocate against the goals, and (iii) to utilise stakeholders as a source of ideas and information.

The US experience provides insights into the first two of these objectives in particular. At the broadest level there was agreement that consensus-building was essential, and that it should start very early in the process. As what was being proposed was new and hence unfamiliar to stakeholders, an important reason given for engaging with stakeholders was to build

³³⁸ Lawrence E. Susskind and Joshua Secunda, "The Risks and Advantages of Agency Discretion: Evidence From EPA's Project XL," *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99), 3.

understanding and through that trust.³³⁹ But there was also a need to address the suspicion of environmental and community groups who: ‘. . . generally perceive innovative proposals as opening the door to rollback of environmental standards.’³⁴⁰

The need to develop approaches to engaging with those being experimented on

A sub-set of stakeholders is the group which is being experimented on. The boundaries between this group and the broader interest group can in fact be fuzzy if there are social, economic or environmental spill-overs from an experiment, but an inner circle can also be defined. Within this circle would be the workers in a facility that was experimenting with an innovative production technology, the owners of homes that were built using an innovative construction method, or the residents in the neighbourhood of facility that was experimenting with a new approach to pollution control.

While external engagement was an important feature of the US experience, what did not come through was a focus on informed consent. This is a core concept in traditional areas of experimentation such as drug testing and surgical procedures. The insights from these traditional areas fall into two categories: the need for informed consent as a legal and ethical issue; and the informed consent process as a discipline on decision-making.

There is a considerable jurisprudence on informed consent.³⁴¹ It covers what information should be provided, the process for engagement and the authority of those whom consent is being sought, the latter of particular importance in situations where there are many affected parties. Explicit experimentation is likely to bring to the fore consideration of these issues.

³³⁹ Multi-State Working Group on Environmental Performance, University of Massachusetts Lowell and Regulatory Policy Program, Mossavar-Rahmani Center for Business and Government, John F. Kennedy School of Government, Harvard University, *Environmental Innovation: A Dialogue on the Role of Government, Law and Regulatory Approaches*, March 31, 2005. Dialogue Summary, January 2006, 8.

³⁴⁰ United States General Accounting Office, *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs* (GAO-02-268, January 2002), 15.

³⁴¹ See Ruth R. Faden and Tom L. Beauchamp, in collaboration with Nancy M. P. King, *A History and Theory of Informed Consent* (New York and Oxford: Oxford University Press, 1986).

The need to gain informed consent can also improve decision-making, as noted by King: ‘Good information is critical to good decisions. For some time it has been recognized that the informed consent process “encourages self-scrutiny by physician-investigators” by requiring them to make their reasoning, and the evidence upon which it is based, transparent to patients and subjects.’³⁴² Effectively, the need for informed consent lifts the bar in terms of analytical rigor, beyond what consultation and possibly even consensus-based strategies for engagement provides.

Notwithstanding the emphasis that has been placed in the US on external engagement, risk-aversion still seems to define the boundaries of experimentation. Thus engagement has two faces. It can contribute to building support for experimentation, but at the same time it heightens awareness of the risks and provides avenues through which preferences can be expressed and outcomes influenced. This phenomena and the effect on experimentation comes through in an assessment of Green Tier:

Broadening the discussion raised the risk that participation could produce or heighten conflict. This risk was limited by controlling the realm of experimentation. This led to an approach that emphasized the ties to past practice and the ongoing efforts in the U.S. and Europe. In effect, it was along the lines of ‘We’re not going to try anything too different too soon.’ It was important to avoid outlandish experiments that got too far ahead of public sentiment, as this might color perceptions and produce a backlash, which could then stymie future innovation. These factors all suggested an incremental transition through continually pushing the debate forwards.³⁴³

³⁴² King, Nancy M. P. “The Line Between Clinical Innovation and Human Experimentation.” *Seton Hall Law Review* 32 (2002): 578.

³⁴³ David Laws and Ian J. Finlayson. “Reframing Regulation: Changing Forms of Law and Practice in U.S. Environmental Policy.” The Environmental Technology and Public Policy Program. Department of Urban Studies and Planning, Massachusetts Institute of Technology. October 12, 2004, 11.

Summing up on the four approaches to experimentation

The benchmarks that I have established for a regulatory regime that facilitates experimentation are that it permits risk-taking, and has in place disciplines to ensure that risks are managed and knowledge is accumulated, assimilated and diffused. Each of the four approaches I have discussed potentially deliver different outcomes across the three dimensions of risk-taking, risk management and learning, as summarised in Table 6.

Table 6: Relationship between regulatory regimes and experimentation

	Risk-taking	Risk management	Learning
Market-based with insurance backup	Unlikely to contribute to risk-taking as incentives on insurance industry to be conservative	Partial contribution to risk management as it provides compensation in the event of failure	Unlikely to contribute to learning as does not create a knowledge system
Informal experts-driven	Unlikely to contribute to risk-taking as it does not embed the experimentation heuristic in the regulatory regime	Partial contribution to risk management through improving expert knowledge	Partial contribution to risk management through improving expert knowledge
Informal regulator-driven	Unlikely to contribute to risk-taking as it does not embed the experimentation heuristic in the regulatory regime	Partial contribution to risk management as regulator better informed of performance of innovative technologies ‘in-market’	May contribute to learning so long as there is a systematic approach to collection, analysis and diffusion of knowledge
Explicit experimentation	Contributes to risk-taking so long as experimentation heuristic is embedded	Contributes to risk management where experiments are ‘controlled’	Contributes to learning so long as there is a systematic approach to collection, analysis and diffusion of knowledge

These approaches are not mutually exclusive, and indeed are likely to be best used in combination. For example, while I have expressed reservations about insurance, some form of compensation arrangement may contribute to risk management, if it can be constructed in such a way that it does not stifle innovation. Learning from rare events will continue to be an important strategy for focused and structured learning within performance-based regulatory regimes that inevitably provide more scope for one-off or prototype designs. There is also a ‘horses for courses’ argument to have a multidimensional strategy. For low-risk innovations a strategy based on systematic monitoring and review may be appropriate, whereas for higher risk innovations explicit experimentation may be required.

The US ‘experiment to experiment’ illustrates that, notwithstanding a commitment to explicit experimentation, in practice it can be very hard to achieve. The fact that explicit experimentation makes risks of failure explicit seems to result in a significant degree of risk aversion, to the extent that the objectives of programmes based on experimentation are undermined.

An explanation of this can be found in Sparrow’s observation on the reluctance of regulators to admit to having discretion, when in fact they are exercising it:

Mostly, I believe, because regulators like this idea, because it makes their position easy to defend. They can say, “We have no choice in the matter, we are simply enforcing the law.” They do not have to explain their use of discretion if people imagine they do not exercise it. In fact, regulatory practice is not as rule bound as reformers suggest. It is not that regulators do not use their discretion; they just do not admit it. If they admitted it, they would inevitably get drawn into discussions over the criteria and methods they use to make enforcement decision (none of which would be specified in law), and such discussions could be embarrassing if they revealed a lack of a defensible rationale for the choices made.³⁴⁴

³⁴⁴ Malcolm K. Sparrow, *The Regulatory Craft: Controlling Risks, Solving Problems, and Managing Compliance* (Washington DC: Bookings Institution Press, 2000), 240. While Sparrow’s observation relates to enforcement discretion it could equally apply to any decision where a regulator has discretion.

Put this into the context of exercising a judgment on whether a technology should be given regulatory approval. In areas where standards-based regulatory regimes have prevailed the need for regulators to exercise discretion has been curtailed. As a general proposition the rules are prescribed and certain and provide reasonably clear benchmarks for regulatory decision-making. However, deciding on whether a ‘non-standard’ alternative solution meets mandatory performance requirements within the framework of a performance-based regulatory regime is an exercise in regulator discretion. The rule book has not yet been written that gives regulators clear and unambiguous direction on how to exercise such discretion. They must therefore fall back on their own judgment, which in turn is influenced by the political, social and legal environment within which they operate.

This environment penalises what the community sees as poor judgment. As a general proposition decisions that expose the community to risk (the regulator fails to prevent a product being marketed that subsequently fails causing harm, or fails to detect and prosecute a wrongdoer) are considered to reflect poor judgment, *even if such judgments are entirely rational given the overall goal that is being pursued*. Given the subjective nature of the discretionary judgments that regulators must make in the absence of a rule book, there are incentives on them to either reduce the transparency of their decision-making or make conservative decisions. The distinctive characteristic of explicit experimentation is that it requires discretionary judgments to be transparent. There is a commensurate level of difficulty in designing and implementing regulatory regimes predicated on explicit experimentation.

Conclusion

The concept of experimentation embodies two ideas, and both need to be accommodated when creating an environment that facilitates experimentation:

1. In a performance-based regulatory regime innovative technologies that are approved are experiments (there is not full knowledge on how they will perform in practice and whether the performance levels that are achieved meet community expectations). To

manage risks and foster learning systems there needs to be a purposeful process for monitoring and review.

2. There is scope to push out the boundaries of innovation by approving more radical technologies if they are treated as explicit experiments as this can permit decision-makers to rationalise their decisions to approve such technologies on the basis that while there are risks, they are able to be managed.

Experimentation is part and parcel of the innovation process. The context in which it is discussed here is the interface between the innovation system and the regulatory regime, and in particular the capacity of the regulatory regime to accommodate ‘in-market’ experimentation. In-market experimentation is the testing of innovative technologies on the community, contrasting this with testing that occurs before such technologies are released on to the market. It implies a purposeful approach to experimentation within a regulatory regime that is designed to accommodate it, rather than it occurring in a default situation as a result of regulatory neglect.

As such, a regulatory regime that accommodates or is permissive of experimentation is presented as strategy that can be deployed to encourage innovation within a performance-based regulatory regime, while managing the risks. It is complementary to a strategy based on improving the quality of decision-making, and an alternative to more conservative strategies that aim to reduce uncertainty through incremental trial-and-error.

The normative argument for experimentation is reflected in the concept of the ‘experimenting society’. It is based on the idea that the challenges facing society can only be met through trying out new things, be they new ways to organise the affairs of society (policy experiments) or new technologies (technical experiments).

In reality technical experimentation is a normal state of affairs as the sciences push out the boundaries of knowledge, creating new but as yet unproven ways of doing things, and providing new insights into the effects of what we currently do (thus revealing them as experiments). In some cases there are purposeful and structured approaches to

experimentation. These include epistemic communities that purposefully learn from rare events that test technologies in extreme situations, regulators that take a purposeful approach to monitoring and review and, in traditional areas, explicit experimentation on patients and volunteers.

However, in relation to the ‘new era’ of performance-based regulation and the demands that it places on decision-making, the approaches that are in place are not embedded in the regulatory regime. With performance-based regulation we have created the opportunity for experimentation. We have seen in the New Zealand case that experimentation will occur. But we do not treat experiments as experiments and hence neither manage nor learn.

This insight is particularly germane to performance-based regulatory regimes that seek to push out the boundaries of technology. Drawing on the area of building, but arguing that the lessons are able to be generalised to any area where there is uncertainty that a particular technology will meet community expectations in relation to performance (having regard to benefits, costs and risks), the lack of a coherent framework for experimentation means that decision-makers are not in a position to push out the boundaries of technology while maintaining the risks within acceptable boundaries.

The elements of such a framework have been identified in this chapter. Drawing these together leads to a key insight, namely that openness and transparency is critical. In essence, effective experimentation (experimentation that results in both risk management and learning) relies on active participation by all stakeholders. Active participation requires participants who are both informed and supportive of experimentation (they have assimilated the experimentation heuristic).

However, the fact of experimentation, and in particular the explicit acknowledgement that it involves going beyond what is known and there is the possibility of failure, seems to change the rules of the game. From a situation where innovative technologies are only tacitly acknowledged as experiments, if that, to public acknowledgement, invites a strong reaction from both internal and external stakeholders who have an interest in maintaining the status quo

and/or are risk averse. This reaction in turn creates a burden of proof on decision-makers to demonstrate that the benefits outweigh the costs and experimentation is preferable to the status quo.

The US experience demonstrates how hard it is to make the transition to a regime based on experimentation and invites the question; can we get away with second best? Second-best in this context is intensive monitoring, analysis and remedial action, supported by some form of compensation arrangement, but without an explicit acknowledgement that innovative technologies are experiments. I would argue not for three reasons. The first is that without such an acknowledgement neither the regulators nor the stakeholders will be sufficiently sensitised to the need to monitor, analyse and act. The second is that when there are the inevitable failures they come as a surprise and invite a reaction, which is likely to be greater conservatism. Thirdly, regulators may permit the use of innovative technologies in situations when they should not, or not permit others when they should, because their choice framework is unnecessarily constrained. In effect, in the absence of a framework for experimentation only the first three of the following five options are available to the regulator:

1. Approve.
2. Decline to approve.
3. Require more pre-market testing.
4. Approve but subject to formal monitoring and evaluation.
5. Approve for limited use and evaluate after a certain period of time.

If we cannot get away with second-best and we do not wish to revert to the ‘safer’ standards-based regulatory regime, at least in high-risk areas (noting that the standards-based approach does accommodate technological change but at a slower rate), then a tactical approach is called for. This involves treating performance-based regulatory regimes that seek to push out the boundaries of technology as explicit policy experiments in their own right.

Chapter 8: Conclusions, implications for policy and future research

Conclusions

The many parents of New Zealand's post-1991 performance-based building control regime achieved one of their objectives; innovation occurred in the design, materials and construction methods of buildings. But it came at a cost. Some combinations of these building elements failed in New Zealand conditions, with dramatic effect. The 'leaky building crisis' may have been a one-off event, or it could be the symptom of a deeper problem with performance-based regulation. If so, could the factors that led to regulatory failure in the building sector in New Zealand arise in other performance-based regulatory regimes?

The evidence from the first part of this study supports the affirmative. It is axiomatic that formulating building standards as goals, without either specifying tried-and-true methods of meeting those goals, or establishing beyond reasonable doubt that new methods will meet those goals, creates the possibility that there will be failures 'in the field'. The first approach, of specifying what is known, defeats the purpose of performance-based regulation. The second is by all accounts impractical in some situations, and is acute when the technology threshold is materially pushed out. This reflects the reality of performance-based regulation.

The acceptance of this reality allows us to create a mental picture of a performance-based regulatory system which is not completely reliant on *ex ante* measurement of how something will perform in the field, and is permissive of some failures. We can then move on to the management of the risks which are inherent in performance-based regulation, rather than either the elimination of these risks, which is impractical, or reverting to a 'safer' regulatory approach, which is defeatist. The evidence from the second part of my study suggests that the application of superior expertise and wisdom to decision-making, and explicit experimentation, offer promise as strategies.

The first question addressed in my thesis is why the performance-based regulatory regime introduced by the Building Act 1991 failed. In this case failure is associated with experimentation with a particular building technology, but to understand the relationship between the post-1991 regime and the failure requires a deeper contextual understanding of experimentation at the level of the regime as a whole.

In effect, the new building control regime was a policy experiment to facilitate technological experimentation. The policy experiment was a shift from a conservative standards-based regulatory regime to a permissive goals-based regulatory regime that reallocated roles amongst the different participants in the regime. It was also an ambitious experiment insofar as the new roles were markedly different, and the technological experiments that were permitted materially pushed out the boundaries of building technology in a New Zealand context.

The two levels of experimentation introduced two levels of uncertainty; will the policy experiment achieve its objectives, and will the technologies perform as expected. A source of failure of the regime is associated with the fact that these uncertainties were not acknowledged. In effect, the post-1991 regime was an example of unconscious experimentation. The practical effect was that the policy experiment was not monitored and evaluated, with remedial action taken to manage emerging risks, and neither were the technological experiments.

There were two potential risks with the policy experiment. The first risk was excessive conservatism, the consequence of which is that society forgoes the benefits of innovation that might otherwise have been adopted. The second risk was excessive risk-taking, with society incurring the cost of failed technologies. In the event, it was the second risk that crystallised in the post-1991 regime.

The performance-based character of the regime, combined with permissiveness, gave rise to an underlying risk factor. The shift from a traditional standards-based regime to a permissive performance-based regime dispersed knowledge that had previously been aggregated in

standards committees and codified in technical standards. The required knowledge is both technical and evaluative. Technical knowledge is more than science, but increasingly knowledge in other domains such psychology, economics, and both domestic and international law. Evaluative knowledge is that which is required to assess risks and consequences.

There was an assumption that the various participants involved in the regime, and in particular frontline regulators, designers, builders and consumers, had the necessary knowledge to make judgments that had in the past been made on their behalf by standards committees, and in particular evaluative knowledge. This assumption proved to be incorrect. In addition, the standards process had provided an important link between the science system and the regulatory regime. Knowledge generated through both formal research and the performance of technologies in the field was transmitted to the regulatory regime through the participation of experts in standards committees. This link was lost in relation to one-off approvals of novel technologies.

The problem of dispersed knowledge could be described as an institutional problem; existing institutions for aggregating, evaluating, codifying and diffusing knowledge had been sidelined and no substitute had been put in place. This is part of the picture. The other part is that the traditional standards-based regulatory regime resulted in a stability of expectations over roles: standards bodies produced standards; designers designed to standards; builders built to standards; regulators checked against standards; and consumers relied on all of these participants to produce a building that was fit-for-purpose. The introduction of a performance-based regulatory regime redefined roles without changing the embedded expectations, and hence behaviours, of participants.

In summary, I consider that a general weakness of performance-based regulatory regimes is that they can result in dispersed knowledge in complex decision-making contexts. In addition, a particular problem arises when there is a fundamental shift from a regime based on aggregated knowledge to one where knowledge is dispersed, and embedded expectations over who is responsible for what, do not change.

If dispersed knowledge is the problem is the aggregation of knowledge the solution? To some extent it is. Aggregating both technical and evaluative knowledge, underpinned by data and information, is required to capture all of the dimensions that need to be taken into account by decision-makers. Aggregation does not, however, adequately address the challenge of pushing out technology thresholds while keeping the risks within boundaries acceptable to the community. Meeting this challenge requires us to rely on a special form of knowledge; namely intuitive judgment, and therefore to pay particular attention to the characteristics of those who exercise such judgment.

Intuitive judgment is required in those situations where it is not possible to accurately measure how a novel technology will perform in all of the circumstances of its possible use, or the likelihood and consequences of low-frequency events that affect performance. This does not describe all novel technologies, but it does describe some technologies that would confer significant benefits on the community if adopted. Intuitive judgment involves making predictions in two areas. The first is predicting how the technology is likely to perform. The second is predicating what is likely to be acceptable to the community, given the benefits, costs and risks. I have coined the term ‘social content’ to describe judgments that have both a technical and ‘acceptable risk’ component.

The body of literature on expertise and wisdom identifies that there are individuals who are more likely to make accurate predictions in these areas than others. The corollary is that if we rely on individuals who do not have these attributes then we are likely to be taking risks that are outside the boundaries acceptable to the community. Higher levels of uncertainty and higher social content require higher levels of expertise and judgment, and hence the more reliant we are on identifying and engaging these unique individuals, and the more risk we are taking if we accept second best.

I turn now to experimentation, and start with the assumption that novel technologies are experiments. No matter how good *ex ante* decision-making is, we still do not know for certain how the technologies will work in practice over their lifetime. I argue the case for explicit experimentation. This requires an acknowledgement that novel technologies are experiments,

and should be designed as experiments. Inherent in the design are matters such as active engagement with those affected by the experiments, and active monitoring and evaluation, with remediation action taken as required and compensation in the event of failure.

Treating novel technologies as explicit experiments should permit technologies that might otherwise be declined to be approved subject to experimentation-related conditions that reduce the risk (such as limited release and active monitoring). Equally important, if novel technologies are generally understood to be experiments then participants in the system are more likely to be sensitised to the risk of failure and hence motivated to be a source of timely feedback on performance.

However, the US experience with experimentation in the environmental area has illustrated the difficulty of moving from a conservative regulatory regime to one that facilitates experimentation. Regulatory regimes appear to be inherently risk-averse. As a consequence I have identified a need for an ‘experimentation heuristic’ to be embedded in regulatory regimes that are intended to materially push out the boundaries of technology to counter this natural bias. Explicit experimentation has been fostered in the areas such as pharmaceuticals and surgical procedures, which demonstrates what is possible even if difficult to attain. Insights provided by these regimes may well provide the best source of information on the features that need to be present for explicit experimentation in performance-based regulatory regimes.

As a final observation, I have established the case for engaging superior experts and wisdom, and explicit experimentation, as necessary conditions for pushing out the boundaries of technology in performance-based regulatory regimes while managing the risks. At the same time, my counterfactual to a strategy of materially pushing out the technology thresholds was incremental trial-and-error. While a permissive performance-based regulatory regime remains the ideal, incremental trial-and-error remains a plausible strategy where the conditions for materially pushing out the thresholds of technology cannot be met. This strategy does not preclude innovation, but inevitably it will be at a slower rate.

Implications for Policy

Introduction

The conclusions that I have reached following an analysis of the failure of New Zealand's performance-based building control regime provides direction to the approaches that could be taken to designing performance-based regulatory systems such that they facilitate innovation, but within boundaries that are acceptable to the community. Are there specific design elements that could be built into New Zealand's current regulatory framework?

This section identifies such design elements. They are presented not as concrete proposals but rather as ideas that warrant further consideration as foundations for a regulatory system configured to facilitate 'safe' innovation. Another way of putting this is that they are intended to set the regulatory regime on a new track which aims to embed a normative presumption in favour of technological experimentation in a set of institutions that have the capacity to manage the risks on behalf of the community. At a practical level the design elements and the 'new track' that carries them must be accommodated in both the legal framework and institutions, with some interplay between the two as legislation can both create institutions and set their operating parameters through prescribing roles, functions and powers.

Legal framework

In a Westminster system of government legislation reflects the will of parliament. Assuming that parliament intends there to be technological experimentation the relevant legislation will need to both provide for that, and, ideally, create the conditions that give an assurance that the intent is carried out in practice. The reason why a distinction is made between design and implementation has been discussed in chapter 3. Experience suggests that those who have responsibility for implementing legislation do not always do so in a manner anticipated by those who were responsible for the design. This risk should be acknowledged at the outset and, as far as possible, reflected in legislation that creates incentives on those responsible for encouraging and facilitating experimentation to apply the spirit and letter of the intent.

The concept of technological experimentation can be reflected in legislation as an encouragement to pursue or facilitate innovation. This is the case with the Building Act 2004, which has as a principle ‘the importance of allowing for continuing innovation in methods of building design and construction’.³⁴⁵ As it can be assumed that technological experimentation is captured by the concept of innovation we may well ask why such a principle is not sufficient to both permit and encourage experimentation. However, for the principle to have such an effect it would need to be clear that innovation involves experimentation, which in turn carries with it a risk of failure. If this is not clear then there can be two possible outcomes. The first is that the regulatory system is overly risk averse as decision-makers do not feel adequately empowered to permit experimentation. The second is that the regulatory system is not sensitised to risk-taking that informally occurs and behaviours do not evolve that are orientated to managing risks.

There is, in my view, a strong argument in favour of making explicit, in legislation, the objective of technological experimentation, rather than relying on innovation being interpreted by a regulator as involving experimentation. An explicit objective of technological experimentation would also help resolve the inherent conflict between building codes that require buildings and building elements to demonstrate compliance with specified performance requirements, and the approval of novel technologies where, in reality, no such assurance can be given. If the ‘fiction’ of certainty is acknowledged, then both what can be known, and the limits of that knowledge, is more likely to be revealed, thus creating a sound empirical foundation for experimentation.

Producers and consumers may also benefit economically from a legislative framework that explicitly provides for technological experimentation. As it stands an assumption is made that the costs of innovating are incurred up-front through pre-market assessment of new building products and systems to the point where compliance with the building code is demonstrated. A legal capacity for designers and producers to experiment should allow them to spread the

³⁴⁵ Building Act 2004 s. 4(2)(g)

costs through developing strategies that have a mix of both pre-market and post-market evaluations.

Consumers benefit because the fact that there is an explicit experimental element to innovative building technologies gives them the information they need to choose whether or not to purchase such technologies. A condition of experimentation would be disclosure to prospective building owners or users. It may also create incentives on producers to offer inducements to consumers to purchase innovative technologies, such as compensation arrangements in the event of failure.

A legislative framework that explicitly provides for technological experimentation should also contain criteria for decision-makers and a prescribed process. In this regard it can be assumed that there will be an *ex ante* approval process for new building technologies as is the case currently. Therefore, a process that applies the experimentation principle will most likely reflect a modification to the standard process.

In the first instance the requirement that building technologies comply with the performance requirements of the building code would need to be relaxed. It is axiomatic that in situations of explicit experimentation such a test could not be met. A revised test would need to take into account uncertain building science, while at the same time ensuring that decisions were still within the bounds of risk-taking acceptable to the community.

This suggests that the test would have two parts. The first is that the decision to approve a novel building technology should be based on the best available science and expert judgment, while at the same time accommodating some uncertainty.

The second part would address the consequences of failure. For example, in situations where the risk is to the economic value of a building the availability of full compensation in the event of failure may be an appropriate risk mitigation strategy. Other strategies could include limiting the diffusion of a novel technology until the building science becomes more certain (based on feedback from the field and additional research), incorporating into the technology

equipment able to monitor performance to detect failure and allow early intervention, or requiring buildings to be ‘robust’, in the sense that if one building element fails others compensate.

In effect, the decision-maker would be given the legal capacity to impose conditions on the use of novel technologies where there was a probability of failure in some circumstances, with those conditions commensurate with the nature and consequences of the failure. The obligation on the decision-maker would be to ensure that the conditions bring the risks within boundaries acceptable to the community. In addition to the legislation creating this capacity it could also identify a non-exclusive list of possible conditions as a way of signalling the options available to both producers and the regulator.

In addition to criteria, the approval process may also need to be prescribed. A key decision is whether legislation should provide for a separate approval process for technological experiments. The alternative is that the legislation simply allows the regulator to impose conditions in situations where the applicant or regulator determines that there is an experimental element. The case for a separate approval process is that it would increase transparency and certainty as to whether an application is to be assessed against the ‘must comply with the building code’ or ‘experimentation’ test. Applicants would be able to opt for one or the other, and it would be clear to them and the regulator what criteria and process applied.

In my view the case for a separate approval process is persuasive. It does not preclude the possibility that, in discussion between the applicant and regulator leading up to or in the course of considering the application, a judgment is made to move a proposed technology from one process to another. Most likely this would be from the ‘must comply’ to the ‘experimentation’ process, as the uncertainties are revealed. Nor does it mean that novel technologies that are deemed experimental necessarily attract onerous conditions. The conditions that are imposed should be proportionate to the nature and level of risk.

The prescribed process should also set out how the decision will be made, and in particular the nature and source of the knowledge required by the regulator to inform its judgment. Inherently we are talking about situations where the demand for good science and expert judgment is high. It is likely that such knowledge will, in any particular situation, be held by a relatively small number of people and these people will be dispersed across a range of institutions. This suggests that a centralised process for identifying and coordinating the requisite knowledge, managed by a single regulator, is likely to be most effective, rather than delegation to regional or local building consent authorities. In effect, the regulator would have a positive legislative obligation to seek out the best available scientific expertise, but having done so should be able to rely on that expertise on matters of science.

In relation to determining community expectations, having regard to the benefits and risks of a novel technology, the situation is different. Under the model that is envisaged the regulator would bring to bear on the decision an evaluation of what would be acceptable to the community. This would also need to be an informed judgment, and it is expected that the regulator would have the legal obligation and organisational capacity to deploy a range of strategies for becoming informed, from convening groups of informed community interests to conducting formal hearings.

Institutions

A legislative framework that provides for explicit experimentation and contains the elements identified in the previous section envisages a regulator who:

- Encourages and actively facilitates technological experimentation;
- Interprets and applies criteria that permit technological experimentation while at the same time ensuring that the risks are within boundaries acceptable to the community;
- Identifies and brings together scientific expertise and community perspectives in such a way that the judgment the regulator is required to exercise is informed by all relevant knowledge.

The implementation of such a regime also requires institutionalised feedback loops.

Feedback is required to both evaluate the policy experiment (experimenting with explicit experimentation) and the technological experiments. Both experiments require systems for monitoring and evaluation. A key question is whether these systems should be maintained by the regulator or a body independent of the regulator. There is a strong argument that the monitoring and evaluation of the policy experiment should be independent of the regulator, but that the monitoring and evaluation of the technological experiments should be fully incorporated in the day-to-day functions of the regulator.

The argument is as follows. We have already observed that performance-based regulatory regimes by their very nature give greater discretion to those responsible for determining whether a novel technology should be adopted. A modified regime based on explicit experimentation and containing clear criteria and decision-making processes should increase the transparency of decisions and hence the accountability of decision-makers, but will not eliminate the scope for discretion. Hence, such a regime could still be implemented with excessive caution or unwarranted risk-taking.

The focus of the scrutiny should be on what parliament has decided, through enacting legislation that provides for explicit experimentation, to be the essential value of such a regime. In other words, while regulators in the normal course of events have to demonstrate that they meet a range of efficiency and effectiveness performance criteria, I suggest that there also needs to be a dedicated focus on the regulator's performance in facilitating technological experimentation within boundaries acceptable to the community.

Parliament itself could take on this scrutiny, through making it one of the functions of a parliamentary select committee or, through the legislation, direct that this scrutiny be undertaken. This could take the form of a mandatory requirement to review the effectiveness of the experimentation part of the legislation, with the review report tabled in the House of Representatives. The review body need not be specified so long as it is clear in the legislation that the review should be undertaken independently of the regulator.

With regard to monitoring technological experiments, a distinction must be made between those who are in a position to observe performance and those who are best placed to assess the significance of the data that is produced and with the authority to act on the basis of the analysis. The first group, which could include building owners and occupiers, producers and territorial authorities, should have roles prescribed in monitoring arrangements established as a condition of the experiment being approved. The second group are in effect the same as those involved in the development and approval of the experiment, namely producers, and the regulator and its advisors (both scientific and community-focused).

While appropriately configured groups may need to be convened to monitor specific experiments, areas of experimentation may also be identified. The advantage of the latter is that this may facilitate the development of bodies of expertise in new areas of importance to technological innovation. Brought together in a committee structure, and underpinned by a normative presumption in favour of experimentation, these bodies of expertise could take on both the monitoring role, and be tasked with identifying research needs in anticipation of the knowledge requirements of future decision-making.

Conclusion

One of the challenges of academic research in the area of public policy is to produce information that is relevant to the formulation of policy. This final part of my thesis attempts to do that in relation to one of the ways in which innovation can be fostered within boundaries acceptable to the community, namely explicit experimentation. The focus is on the law and institutions. These laws and institutions can create incentives and capabilities, but how they operate is influenced by a broader set of incentives and capabilities which are exogenous to the system that is being created. These cannot be always be anticipated and managed in advance. The importance of treating any new regime as a policy experiment cannot be over-emphasised.

Future research

The literature points to the fact that there are some amongst us who are able to make accurate predictions in complex decision-making contexts where there is a high degree of uncertainty. It is the intuitive judgment of these people as a form of knowledge that we value, in combination with other knowledge and sources of data and information. I have left open the question of who should ultimately make the decision on whether or not to approve a novel technology that has a significant social content. In a New Zealand context the Legislation Advisory Committee Guidelines would suggest that such decisions should be made by elected representatives as they are political judgments. However, shouldn't decision-making in highly technical areas be left to properly constructed communities of public interest that combine both superior technical expertise and wisdom? In a New Zealand context the role of elected representatives vs communities of public interest is unresolved, and there is scope for more research on this topic.

I have provided some direction, but ultimately not settled on what the appropriate roles of the various participants in performance-based regulatory regimes should be. I have identified a key role for people with certain characteristics in exercising judgment in complex decision-making contexts, but in a collective capacity. Hence there is also a role for appropriate institutions. I have also established the need for performance-based regulatory regimes to be based on reliable feedback on the performance of both the policy experiment and the technology experiments. Hence there is a role for both senders and receivers of information, and an overall coordination function. I have suggested that we cannot rely on some participants to carry out certain roles. In a building context, consumers and builders are not well placed to make risk-based decisions on innovative technologies. However, this is only a starting point, and more research is required on an appropriate configuration of roles.

I have identified a critical connection between science and law in performance-based regulatory regimes but not developed this theme. While there is likely to be more than more

than one line of enquiry, I suggest that there is scope to introduce ‘engineering’ principles into statutes that establish performance-based regulatory regimes. Currently, statutes may include requirements for cost-benefit analysis and risk analysis, and from time to time the precautionary principle. However, those involved in developing the underlying standards apply the principles of robustness and resilience (both of which aim to build redundancy into the application of new technologies, such a single span of a bridge that collapses to save the failure of the bridge as a whole), and reversibility (in the event of a failure it is possible to return to the original state). These principles permit the technology thresholds to be pushed further out through lowering the risks or consequences. Making them an explicit part of the rule-making process through inclusion in statute may help embed the experimentation heuristic.

Bibliography

- Abrams, Nancy Ellen, and R. Stephen Berry. "Mediation: A Better Alternative To Science Courts." *Bulletin of the Atomic Scientists*. (April 1977).
- Alleman, James H., and Paul Rappoport. "Regulatory Failure: Time for a New Policy Paradigm." *Communication and Strategies* 4: 60 (2005): 105-121.
- Altrichter, Herbert, and Peter Posch. "Does the 'Grounded Theory' Approach Offer a Guiding Paradigm for Teaching Research." *Cambridge Journal of Education* 19: 1 (1989): 21-30.
- American Bureau of Shipping. *Guidance Notes on Alternative Design and Arrangements for Fire Safety*. Houston, TX: ABS, January 2004.
- Ang, George, Marcel Groosman, and Nico P. M. Scholten. "Dutch Performance-Based Approach to Building Regulations and Public Procurement." *Building Research and Information* 33: 2 (April 2005): 107.
- Arlin, P. K. "Wisdom and Expertise in Teaching: An Integration of Perspectives." *Learning and Individual Differences* 5: 4 (1993): 341-349.
- Assmann A. "Wholesome Knowledge: Concepts of Wisdom in a Historical and Cross-Cultural Perspective." In *Life-Span Development and Behavior 12*, edited by D. L. Featherman, R. M. Lerner, and M. Perlmutter, 187-224. Hillsdale, NJ: Erlbaum, 1994.
- Ayres, Ian, and John Braithwaite. *Responsive Regulation: Transcending the Deregulation Debate*. Oxford: Oxford University Press, 1992.
- Backer, Larry. C. "Economic Globalization and the Rise of Efficient Systems of Global Private Lawmaking: Wal-Mart as Global Legislator." *University of Connecticut Law Review* 39: 4 (2007).
- Baldwin, Robert, and Martin Cave. *Understanding Regulation: Theory, Strategy and Practice*. Oxford: Oxford University Press, 1999.
- Baldwin, Robert. "Is Better Regulation Smarter Regulation?" *Public Law* Autumn, (2005): 485-511.
- Baldwin, Robert. "Regulation: After 'Command and Control'." In *The Human Face of Law*, edited by K. Hawkins, Oxford: Clarendon Press, 1997.
- Baldwin, Robert. *Rules and Government*. Oxford: Oxford University Press, 1995.
- Baltes, P. B. "The Aging Mind: Potential and Limits." *Gerontologist* 33: 5 (October 1993): 580-594.

Baltes, P. B., and J. Smith. "The Psychology of Wisdom and its Ontogenesis." In *Wisdom: Its Nature, Origins, and Development*, edited by R. J. Sternberg, 87-120. New York: Cambridge University Press, 1990.

Baltes, P. B., and U. M. Staudinger. "Wisdom: a Metaheuristic (Pragmatic) to Orchestrate Mind and Virtue towards Excellence." *Am Psychol* 55: 1 (January 2000): 122-136.

Baltes, P., F. Dittmann-Kohli, and R. Dixon. "New Perspectives on the Development of Intelligence in Adulthood: Toward a Dual-Process Conception and a Model of Selective Optimization with Compensation." In *Life-Span Development and Behavior* 6, edited by P. B. Baltes and O. G. Brim, Jr, 1029-1143. New York: Academic Press, 1984.

Bardach, Eugene, and Robert. A. Kagan. *Going by the Book: The Problem of Regulatory Unreasonableness*. Philadelphia: Temple University Press, 1982.

Bardach, Eugene. "Social Regulation Social Regulation as a Generic Policy Implement." In *Beyond Privatization, The Tools of Government Action*, edited by Lester Salamon, 197-229. Washington, D.C: Urban Institute Press, 1989.

Barnard, R. C. "Some Regulatory Definitions of Risk: Interaction of Scientific and Legal Principles." *Regulatory Toxicology and Pharmacology* 11: 2 (April 1990): 201-11.

Barrett, Susan M. "Implementation Studies: Time for a Revival? Personal Reflections on 20 Years of Implementation Studies." *Public Administration* 82: 2 (May 2004): 249-262.

Behn, Robert. D. *Rethinking Democratic Accountability*. Washington, D.C: Brookings Institution Press, 2001.

Bell, M., and R. Lowe. "Building Regulation and Sustainable Housing. Part 1: A Critique of Part L of the Building Regulations 1995 for England and Wales." *Structural Survey* 18: 1 (March 2000): 28-37.

Beller, D., P. Everall, G. Foliente, and B. Meacham. "Qualitative Versus Quantitative Aspects of Performance-Based Regulations." Paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001.

Benson, Brian R. "Recladding Wood Frame, Stucco Clad Buildings Using Rainscreen Concepts." Paper presented at the International Conference on Building Envelope Systems and Technologies. Ottawa, Canada, 2001.

Berg, Nathan. "Normative behavioral economics." *Journal of Socio-Economics* 32: 4 (September 2003): 411-427.

Bergeron, Denis, Bob Bowen, Beth Tubbs, Tony Rackliffe. "Acceptable Solutions." Paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, 2001.

Berlin, Isaiah. "The Hedgehog and the Fox." In *The Proper Study of Mankind: An Anthology of Essays*, by Isaiah Berlin. New York: Farrar, Straus and Giroux. 1998.

Bernheim, B. Douglas, and Antonio Rangel. "Behavioral Public Economics: Welfare and Policy Analysis with Non-Standard Decision Makers" NBER Working Paper no. W11518, 2005.

Better Regulation Task Force. *Regulation – Less is More. Reducing Burdens, Improving Outcomes. A BRTF Report to the Prime Minister*. London: BRC, March 2005.

Bettman, James. R., Mary Frances Luce, and John W. Payne. "Constructive Consumer Choice Processes." *Journal of Consumer Research* 25: 3 (December 1998): 187.

Black, Donald. *The Behavior of Law*. New York: Academic Press, 1976.

Black, Julia. *Critical Reflections on Regulation*. London: The London School of Economics and Political Science, 2002.

Bluff, Elizabeth, and Neil Gunningham. *Principle, Process, Performance or What? New Approaches to OHS Standards Setting*. Working Paper 9. National Research Centre for OHS Regulation, July 2003.

Botkin, Daniel B. *Discordant Harmonies: A New Ecology for the twenty-first Century*. Oxford: Oxford University Press. 1990.

Botkin, Daniel B. *Strange Encounters: Adventures with a Renegade Naturalist*. New York: Jeremy P. Tarcher/Penguin, 2003.

Braithwaite, John. "Responsive Business Regulatory Institutions." In *Business Ethics and the Law*, edited by C. A. J. Coady and Charles J. C. Sampford, 83-92. Sydney: The Federation Press, 1993.

Braithwaite, John. "The Limits of Economism in Controlling Harmful Corporate Conduct." *Law and Society Review* 16:3 (1981/1982): 481-504.

Braithwaite, John. *Improving Regulatory Compliance: Strategies and Practical Applications in OECD Countries*. PUMA Occasional Papers in Public Management, OECD, Paris, 1993.

Braithwaite, John. *Regulatory Capitalism: How it Works, Ideas for Making it Work Better*. Cheltenham, UK: Edward Elgar Publishing, 2008.

Brannigan Vincent, and Anthony Kilpatrick. "Performance-Based Fire Safety Regulations: Getting it Right Part 1." *Fire Chief*. Primedia Business Magazines and Media, 2005. http://firechief.com/mag/firefighting_performancebased_fire_safety/ (accessed March 15, 2005)

Brannigan Vincent, and Anthony Kilpatrick. *Requirements for the Legal Interface between Performance Based Design and Performance Based Safety Regulation*. Paper presented at the Construction and Building Conference of the Royal Institution of Chartered Surveyors. London: UK, September 7-8, 2006.

Brannigan, Vincent, and Anthony Kilpatrick. "Fire Scenarios in the Enforcement of Performance-Based Fire Safety Regulations." *Journal of Fire Sciences* 18: 5 (2000): 354-375.

Brannigan, Vincent, and Carol Smidts. "Performance Based Fire Safety Regulation Under Intentional Uncertainty." *Fire and Materials* 23: 6 (2000): 341-347.

Brannigan, Vincent, Carol Smidts, and Anthony Kilpatrick. "Regulatory Requirements for Performance Based Codes using Mathematical Risk Assessment." Paper presented at Interflam Conference, Interscience Communications Ltd., London, UK, March 26-28, 1996.

Brannigan, Vincent. "Teaching Ethics in the Engineering Design Process: A Legal Scholar's Perspective." Paper presented at 33rd ASEE/IEEE Frontiers in Education Conference, Boulder, CO, USA, November 5-8, 2003.

Bratman, Michael E. *Intention, Plans and Practical Reason*. Stanford, California: Center for the Study of Language and Information, 1999.

Breyer, Stephen G. *Regulation and Its Reform*. Cambridge, Massachusetts: Harvard University Press, 1982.

Breyer, Stephen G., and Veerle Heyvaert. "Institutions for Regulating Risk." In *Environmental Law, the Economy, and Sustainable Development*, edited by Richard L. Revesz, Philippe Sands, and Richard B. Stewart, 283-352. Cambridge: Cambridge University Press, 2000.

Breyer, Stephen. G., and Richard B. Stewart, *Administrative Law and Regulatory Policy: Problems, Texts, and Cases (3rd edition)*. Boston: Little, Brown and Company, 1992.

Brown, Phil. "Popular Epidemiology: Community Response to Toxic Waste-Induced Disease in Woburn, Massachusetts." *Science, Technology, and Human Values* 12: 3-4 (1987): 78-85.

Bryner, Gary C. "Trends in Social Regulation." In *Handbook of Regulation and Administrative Law*, edited by David H. Rosenbloom and Richard D. Schwartz, 73-90. New York: M. Decker, 1994.

Buchanan, A. H., B. L. Deam, M. Fragiocomo, Tony Gibson, and Hugh Morris. "Fifteen Years of Performance-Based Design in New Zealand." Paper presented at the 9th World Conference on Timber Engineering, Portland, OR, USA: August 6-8, 2006. In Proceedings of the 9th World Conference on Timber Engineering (WCTE 2006), 3.9.2, 8pp. (Conference Contribution - Paper in published proceedings)
<http://hdl.handle.net/10092/30>

Building Industry Commission. *Reform of Building Controls (vol.1)*. A report to the Minister of Internal Affairs. Wellington: New Zealand, January 1990.

Building Regulatory Reform Advisory Group. *Knowledge Accountability Streamlining: Cornerstones for a New Building Regulatory System in Ontario*. A report to the Minister of Municipal Affairs and Housing. Ontario: Canada, July 2000.

Bukowski, Richard W. "A Hypothetical Model for a Performance-based Codes System for the United States." In *Wood Engineering in the 21st Century: Research Needs and Goals*, edited by Kenneth J. Fridley, 87-95. Proceedings of the Workshop offered in conjunction with the SEI/ASCE Structures Congress XV. Portland, Oregon: American Society of Civil Engineers, 1997.

Bukowski, Richard W., Y. Hirano, Tony Rackliffe, and Robert Bowen. "Standards Linkages to a Performance-Based Regulatory Framework." Paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001.

Burby, Raymond J., and Peter J. May. *Making Governments Plan – State Experiments in Managing Land Use*. Baltimore and London: The John Hopkins University Press, 1997.

Burby, Raymond J., and R. C. Paterson. "Improving Compliance with State Environmental Regulations." *Journal of Policy Analysis and Management* 12: 4, (1993): 753-772.

Burman, Erica. "Minding the Gap: Positivism, Psychology and the Politics of Qualitative Research." *Journal of Social Issues* 53: 4 (1997): 785-803.

Burrows, J. F. *Statute Law in New Zealand, 3rd ed.* Wellington: Lexis Nexis, 2003.

Butterpaper. "Leak Peak Not Freak." Butterpaper News Archive 2002: 10, (October/November 2002).
http://www.butterpaper.com/resource/news/news_archive_2002_10.htm (accessed May 13, 2009).

Caldwell, Bruce. *Hayek's Challenge: an Intellectual Biography of F. A. Hayek*. Chicago: University of Chicago Press, 2004.

Calloway, Linda Jo, and Constance A. Knapp. *Using Grounded Theory to Interpret Interviews*. New York: Pace University, 1995.
<http://csis.pace.edu/~knapp/AIS95.htm> (accessed 7 February, 2009)

Camerer, Colin F., and George Loewenstein. "Behavioral Economics: Past, Present, Future." In *Advances in Behavioral Economics*. Colin F. Camerer, George Loewenstein, and M. Rabin. Princeton: Princeton University Press, 2003.

Cameron, J. "The Precautionary Principle." In *Trade, Environment and the Millennium*. Gary P. Sampson, W. Bradnee Chambers. United Nations University Press, 1999.

Campbell, Donald T., and E. Samuel Overman (ed.) *Methodology and Epistemology for Social Sciences: Selected Papers*. Chicago: University of Chicago Press, 1988.

Campbell, Donald T. "The Experimenting Society." In *The Experimenting Society: Essays in Honor of Donald T. Campbell*, edited by William N. Dunn, 35-68. Policy Studies Review Annual, Vol. 11. New Brunswick, NJ: Transaction Publishers, 1998.

Campbell, Lisbeth. "Legal Drafting Styles: Fuzzy or Fussy?" *Murdoch University Journal of Law* 3: 2 (July 1996).

Cassella, Alessandra. "Free Trade and Evolving Standards." In *Fair Trade and Harmonization: Prerequisites for Free Trade?* Edited by Jagdish N. Bhagwati and Robert E. Hudec. Cambridge, MA: MIT Press, 1996.

Cheit, Ross E. *Setting Safety Standards: Regulation in the Public and Private Sectors*. Chicago: University of Chicago Press, 1990.

Chen, Maggie Xiaoyang, and Aaditya Mattoo. "Regionalism in Standards: Good or Bad for Trade?" Policy Research Working Paper Series 3458, The World Bank, 2004.

Christoph Engel. "Institutions for Intuitive Man," Working Paper 2007: 12, Max Planck Institute for Research on Collective Goods. 2007.

Clark, Susan J., Mark Jones, and Ian C. Page. *BRANZ Study Report no. 142*. New Zealand 2005 House Condition Survey, 2005.

Clayton, V., and J. E. Birren. "The Development of Wisdom Across the Life Span." In *Life Span Development and Behavior* vol. 3, edited by P. B. Baltes and O. G. Brim, 103-135. New York: Academic Press, 1980.

Coglianesi, Cary, and David Lazar. *Management-Based Regulation: Prescribing Private Management to Achieve Public Goals*. Washington DC: AEI Brookings Joint Center for Regulatory Studies, 2002.

Coglianesi, Cary, Jennifer Nash, and Todd Olmstead. *Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Protection*. Regulatory Policy Program Report No. RPP-03, 2002.

Cole, Michael. "Interacting Minds in a Life-span Perspective: a Cultural-Historical Approach to Culture and Cognitive Development." In *Interactive Minds: Life-span Perspectives on the Social Foundation of Cognition*, edited by Paul B. Baltes and Ursula M. Staudinger. New York: Cambridge University Press.

Commission of Inquiry into Housing in New Zealand. *Housing in New Zealand*. Wellington: New Zealand, April 1971.

Commission of Inquiry into the Quality of Condominium Construction in British Columbia. *The Renewal of Trust in Residential Construction: An Inquiry into the Quality of Condominium Construction in British Columbia*. BC: Canada, 1988.

Commission of the European Communities. *Communication from the Commission on the Precautionary Principle*. Brussels, 2000.

Cook, Karen Schweers, and Margaret Levi. *The Limits of Rationality*. Chicago: The University of Chicago Press, 1990.

Covello, Vincent T., and Jeryl Mumpower. "Risk Analysis and Risk Management: An Historical Perspective." *Risk Analysis* 5: 2 (1985): 103-120.

Cramer, Steven M., and Robert H. White. *Fire Performance Issues*. In *Wood Engineering in the 21st Century: Research Needs and Goals*. Proceedings of the Workshop offered in conjunction with the SEI/ASCE Structures Congress XV, Portland, Oregon, edited by Kenneth J. Fridley, 75-86. Reston, VA: ASCE, 1998.

Crawford, Sue E. S., and Elinor Ostrom. "A Grammar of Institutions." *The American Political Science Review* 89: 3 (1995): 582-600.

Creswell, John W. *Qualitative Inquiry and Research Design: Choosing Among Five Traditions*. Thousand Oaks CA: Sage Publications, 1998.

Cullen, Hon Lord. *The Public Inquiry into the Piper Alpha Disaster, Vol. 2*. London, HMSO, 1990.

Daintith, Terence C. "A Regulatory Space Agency." *Oxford Journal of Legal Studies* 9: 4 (1989): 534-546.

Daintith, Terence C. "Law as a Policy Instrument: Comparative Perspective." In *Law as an Instrument of Economic Policy: Comparative and Critical Approaches*, edited by Terence C. Daintith. Berlin: Walter de Gruyter, 1988.

Dalziel, Lianne. "Design and Build it Right First Time." *Weathertightness News*, 2 (June 2003).

Dawney, Emma, and Hetan Shah. *Behavioural Economics: Seven Principles for Policy-Makers*. New Economics Foundation. United Kingdom: New Economics Foundation, July 2005.

Dembner, Alice. "Lawsuits Target Medical/Research Patient Safeguards." *The Boston Globe*, August 12, 2002.

Den Butter, Frank A. G., Stefan P. T. Groot, and Farook Lazrak. "The Transaction Costs Perspective on Standards as a Source of Trade and Productivity Growth" Tinbergen Institute Discussion Papers 07-090/3, November 2007.
<http://ssrn.com/abstract=1032135>

Department for Business Enterprise and Regulatory Reform. *Improving Outcomes from Health and Safety: A Report from the Better Regulation Executive*. London: BRE, August 2008.

Department of Building and Housing and Consumer NZ. "Damp and some mould or fungi can have serious health implications for some people living in a leaky home." *ConsumerBuild*. <http://www.consumerbuild.org.nz/publish/leaky/leaky-health-risks.php> (accessed May 13, 2009).

Department of Building and Housing. "Building Consent and Inspection Process." www.tenancy.govt.nz/blc-building-consentinspect-process (accessed May 13, 2009).

Department of Building and Housing. *Building for The 21st Century: Review of the Building Code*. Wellington: DBH, May 2006.

Department of Building and Housing. *Constructing Cavities for Wall Claddings*. Wellington: DBH, 2006.

Department of Building and Housing. *External Moisture – An Introduction to Weathertightness Design Principles*. Wellington: DBH, August 2006.

Department of Building and Housing/ Standards New Zealand. *Timber Treatment Requirements. Notes for Builders*. Wellington: DBH, February 2005.

Department of Health for Scotland. *Report of the Committee on Building Legislation in Scotland*. HMSO, October 1957.

Deroukakis, Eleni. *Performance-Based Codes Impact on International Trade*. Inter-Jurisdictional Regulatory Collaboration Committee Occasional Paper. Canada: NRC, 2000.

Dey, Ian. *Grounding Grounded Theory: Guidelines for Qualitative Inquiry*. San Diego, CA: Academic Press, 1999.

- Dixon, John., and Rhys Dogan. "The Conduct of Policy Analysis: Philosophical Points of Reference." *Review of Policy Research* 21: 4 (2004): 559-579.
- Doern, G. Bruce. *Red Tape, Red Flags: Regulation for the Innovation Age*. Ottawa, Ontario: The Conference Board of Canada, 2007.
- Dorner, Dietrich. "Heuristics and Cognition in Complex Systems." In *Methods of Heuristics*. Walter F. Bischof, Marina Groner, Rudolf Groner, 89-107. Hillsdale, NJ: Lawrence Erlbaum Associates, 1983.
- Douglas, M. *Risk Acceptability According to the Social Sciences*. Beverley Hills, CA: Russell Sage Foundation, 1985.
- Douglas, Mary, and Aaron Wildavski. *Risk and Culture – An Essay on the Selection of Technological and Environmental Dangers*. Berkley: University of California Press, 1982.
- Douglas, Mary. *In the Active Voice*. London: Routledge Kegan and Paul, 1982.
- Drefuss, R. C. "Forums of the Future: The Role of Specialist Courts in Resolving Business Disputes." *Brooklyn Law Review* 61: 1 (1995).
- Dreyfus, Hubert L, and Stuart E. Dreyfus. *Mind over Machine: The Power of Human Intuition and Expertise in the Era of the Computer*. New York: The Free Press, 1986.
- Driesen, David M. "The Economic Dynamics of Environmental Law: Cost-Benefit Analysis, Emissions Trading, and Priority-Setting." *Boston College Environmental Affairs Law Review* 31: 3 (2004): 501-528.
- Duhue, Trudy. "Establishing the Experimenting Society: The Historical Origin of Social Experimentation According to the Randomized Controlled Design." *American Journal of Psychology* 114: 2 (2001): 283-302.
- Dunleavy, Patrick. *Democracy, Bureaucracy and Public Choice*. London: Harvester Wheatsheaf, 1991.
- Eisner, Marc Allen. "Economic Regulatory Policies: Regulation and Deregulation in Historical Context." In *Handbook of Regulation and Administrative Law*, edited by David H. Rosenbloom and Richard D. Schwartz. New York: M. Decker, 1994.
- Ericsson, K. Anders, Neil Charness, Paul J. Feltovich, and Robert R. Hoffman. *The Cambridge Handbook of Expertise and Expert Performance*. Cambridge: Cambridge University Press. 2006
- European Thematic Network Fire in Tunnels. General Report. Brussels, Belgium. <http://www.etnfit.net>. (Accessed March 30, 2006).

External Advisory Committee on Smart Regulation. *Smart Regulation - A Regulatory Strategy for Canada*. Report to the Government of Canada. September 2004.

Faden, Ruth R. and Tom L. Beauchamp, in collaboration with Nancy M. P. King. *A History and Theory of Informed Consent*. New York and Oxford: Oxford University Press, 1986.

Faigman, David L. "Is Science Different for Lawyers?" *Science* 197: 5580 (July 2002): 339-340.

Falk, R. *Predatory Globalization: A Critique*. Oxford & Malden MA: Blackwell Publishers, 1999.

Fessenden-Raden, J., J. M. Fitchen, and J. S. Heath. "Providing Risk Information in Communities: Factors Influencing what is Heard and Accepted." *Science, Technology, and Human Values* 12 (1987): 94-101.

Fest, Glen. "Meeting Regulators' Ends, Not Means, Lowers Risk." *Bank Technology News* 20: 2 (February 2007): 16.

Field, Thomas G. "Pursuing Transparency through Science Courts." Proceedings, VALDOR (Values in Decisions on Risk) Symposium, 229, Stockholm, June 13-17, 1999.

Fiorino, Daniel J. "Citizen Participation and Environmental Risk: A Survey of Institutional Mechanisms." *Science, Technology and Human Values* 15: 2 (April 1990): 226-243.

Fiorino, Daniel J. "Environmental Risk and Democratic Process: A Critical Review." *Columbia Journal of Environmental Law* 14: 2 (1989): 501-547.

Fiorino, Daniel J. "Technical and Democratic Values in Risk Analysis." *Risk Analysis* 9: 3 (1989): 293-299.

Fiorino, Daniel J. "Towards a New System of Environmental Regulation: the Case for an Industry Sector Approach." *Environmental Law* 26: 2, (1996): 457-489.

Fischhoff, Baruch, Sarah Lichtenstein, Paul Slovic, Steven L. Derby, and Ralph Keeney. *Acceptable Risk*. Cambridge: Cambridge University Press, 1981.

Fisher, Elizabeth. "Drowning by Numbers: Standard Setting in Risk Regulation and the Pursuit of Accountable Public Administration." *Oxford Journal of Legal Studies* 20: 1 (2000): 109-130.

Fisher, Elizabeth. "Opening Pandora's Box: Contextualising The Precautionary Principle in the European Union". University of Oxford Faculty of Law Legal Studies Research Paper Series. Working Paper No 2/2007. January 2007.

Fisher, Elizabeth. "The Rise of the Risk Commonwealth and the Challenge for Administrative Law." *Public Law* Autumn (2003): 455-478.

Fletcher, G. J. O. (1995). *The Scientific Credibility of Folk Psychology*. Mahwah, NJ: Lawrence Erlbaum Associates.

Flores, Albert, and Michael E. Kraft. "Controversies in Risk Analysis in Public Management." In *Ethics, Government, and Public Policy*, edited by James S. Bowman and Frederick A. Elliston, 105-135. New York: Greenwood Press, 1988.

Foliente, Greg C. "Developments in Performance-Based Building Codes and Standards." *Forest Publications Journal* 50: 7/8 (2000): 12-21.

Foucault, Michael. *The Order of Things. An Archaeology of the Human Sciences*. USA: Vintage Books, 1994.

Francis, John G. *Politics of Regulation: A Comparative Perspective*. Oxford: Wiley Blackwell, 1993.

Friedman, Michael A. "What Is the Value of an FDA Approval in a Judicial Matter?" *Journal of Law and Policy*, 12 (2004): 559-571.

Gann, D. M., Y. Wang, and R. Hawkins. "Do Regulations Encourage Innovation? – The Case of Energy Efficiency in Housing." *Building Research and Information* 26: 5 (1998): 280-296.

Gates, Sean P. "Standards, Innovation and Anti-trust: Integrating Innovation Concerns into the Analysis of Collaborative Standard Setting." *Emory Law Journal* 47 (1998): 583.

Genn, H. "Business Responses to the Regulation of Health and Safety in England." *Law and Policy* 15: 3 (1993): 219-35.

Gilboy, Janet. "Compelled Third Party Participation in the Regulatory Process: Legal Duties, Culture, and Noncompliance." *Law and Policy* 20: 2 (2002): 135-155.

Glaser, Barney G. *Basics of Grounded Theory Analysis: Emergence Vs. Forcing*. Mill Valley, CA: Sociology Press, 1992.

Gormley, JR, William T. "Regulatory Enforcement Styles." *Political Research Quarterly* 51: 2 (1998): 363-383.

Gottweis, Herbert. *Governing Molecules. The Discursive Politics of Genetic Engineering in Europe and the United States*. The MIT Press Cambridge, Massachusetts, 1998.

Government Administration Select Committee. *Inquiry into the Weathertightness of Buildings in New Zealand*. Wellington: New Zealand, March 2003.

Grabosky, Peter N. "Counterproductive Regulation." *International Journal of the Sociology of Law* 23 (1995): 347-369.

Grabosky, Peter N. "Green Markets: Environmental Regulation by the Private Sector." *Law and Policy* 16: 4 (1994): 419-448.

Grabosky, Peter N. "Regulation by Reward: On the Use of Incentives as Regulatory Instruments." *Law and Policy* 17: 3 (1995): 256-281.

Grabosky, Peter N. "Using Non-Governmental Resources to Foster Regulatory Compliance." *Governance: An International Journal of Policy and Administration, and Institutions* 8: 4 (1995): 527-550.

Gray, Wayne B, and John T. Scholz. "Analysing the Equity and Efficiency of OSHA Enforcement." *Law and Policy* 3: 13 (1991): 185-214

Greater Wellington Regional Council. "Building Changes Will Swing Pendulum Back." *Infonews.co.nz*. March 26, 2008. www.infonews.co.nz/news.cfm (accessed 29 July 2008).

Gregory, Bob. "Bringing Back the Buck: Responsibility and Accountability in Politics and the State Sector." *Public Sector* 30: 2 (2007): 4-8.

Gunningham, Neil, and Joseph Rees. "Industry Self-Regulation: An Institutional Perspective." *Law and Policy* 19: 4 (1997): 363-414.

Gunningham, Neil, and Richard Johnstone. *Regulating Workplace Safety: Systems and Sanctions*. Oxford: Oxford University Press, 1999.

Gunningham, Neil, Peter N. Grabosky, and Darren Sinclair. *Smart Regulation: Designing Environmental Policy*. Oxford and New York: Oxford University Press, 1998.

Gunningham, Neil. "Beyond Command and Control: Towards Flexible and Cost-Effective Business Regulation: in *Business, Ethics, and the Law*, C. A. J. Coady and Charles J. G. Samford, 93-112. Leichhard, NSW: Federation Press, 1993.

Gunningham, Neil. *Safeguarding the Worker*. Sydney: Law Book Company, 1984.

Hahn, Robert W., and Cass R. Sunstein. "The Precautionary Principle as a Basis for Decision Making." *The Economists' Voice* 2: 8 (2005).

Hahn, Robert W., and Paul C. Tetlock. "Has Economic Analysis Improved Regulatory Decisions?" AEI-Brookings Joint Center Working Paper No. 07-08, April 2007.

Hahn, Robert W., and Robert N. Stavins. "Incentive Based Environmental Regulation: A New Era from an old Idea?" *Ecology Law Quarterly* 18: 1 (1991): 1-42.

Haig, Brian. D. "Grounded Theory as Scientific Method." In *Philosophy of Education Society Yearbook*, 281-290. Urbana: University of Illinois Press, 1995.

Haines, Fiona. *Corporate Regulation: Beyond 'Punish or Persuade'*. Oxford: Clarendon Press, 1997.

Hall, P. A. "Policy Paradigms, Social Learning and the State: The Case of Economic Policy-Making in Britain." *Comparative Politics* 25: 3 (1993): 275-296.

Hamilton, W. D. "Innate Social Aptitudes of Man: an Approach from Evolutionary Genetics." In *Biosocial Anthropology*, edited by Robin Fox. London; Malaby Press, 1975.

Hampton, Philip. "Reducing Administrative Burdens: Effective Inspection and Enforcement." The Hampton Review. Norwich: HMSO, March 2005.

Haroutunian-Gordon, Sophie. "Mind over Machine: a Plea for the Intuitive Conception of Mind." Review of *Mind Over Machine: The Power of Human Intuition and Expertise in the Era of the Computer*, by Hubert L. Dreyfus and Stuart E. Dreyfus. *Educational Researcher* 17: 3, 1988: 50-52.

Harrison, Kathryn, and George Hoberg. *Risk Science and Politics: Regulating Toxic Substances in Canada and the United States*. Montreal: McGill-Queen's University Press, 1994.

Haselager, W. F. G. *Cognitive Science and Folk Psychology: The Right Frame of Mind*. London: SAGE, 1997.

Haworth, Lawrence. "The Experimental Society: Dewey and Jordan." *Ethics* 71: 1 (1960): 27-40.

Haythornthwaite, R. *The Regulation of Risk – Setting the Boundaries*. Occasional Lecture 16, delivered at the Royal Society of Arts, University of Bath, CIPFA, March 30, 2006.

Heaton, G. R., and D. R. Banks. "Towards a New Generation of Environmental Technology – the Need for Legislative Reform." *Journal of Industrial Ecology* 1: 2 (1997): 23-32.

Hedlund, James. "Risky Business: Safety Regulations, Risk Compensation, and Individual Behaviour." *Injury Prevention* 6 (2000): 82-89.

Heyes, Anthony G. "A Signaling Motive for Self-Regulation in the Shadow of Coercion." *Journal of Economics and Business, Elsevier* 57: 3 (December 2003): 238-246.

Hirsch, Dennis D. "Bill and Al's XL-Ent Adventure: An Analysis of EPA's Legal Authority to Implement the Clinton Administration's Project XL." *University of Illinois Law Review* 129: 2 (1988).

Hitchcock, Edward. "Technological Law: Societal Control of Technology and the Potential of the World Standards Movement." PhD diss., University of Auckland, 1979.

HM Treasury. *The Setting of Safety Standards*. London, June 28, 1996.

Hood, Christopher, Henry Rothstein, and Robert Baldwin. *The Government of Risk: Understanding Risk Regulation Regimes*. Oxford: Oxford University Press, 2001.

Hood, Christopher. *Explaining Economic Policy Reversals*. Buckingham: Open University Press, 1994.

Hopkins, Thomas. *Profiles of Regulatory Costs. Report to the U.S. Small Business Administration*. U.S. Department of Commerce, National Technical Information Service #PB96 128038, November 1995.

Horn, Murray J., and Kenneth A. Shepsle. "Commentary on Administrative Arrangements and the Political Control of Agencies: Administrative Process and Organizational Form as Legislative Responses to Agency Costs." *Virginia Law Review* 75: 2 (1989): 499-508.

Howard, George S., and Paul R. Myers. "Predicting Human Behavior: Comparing Idiographic, Nomothetic, and Agentic Methodologies." *Journal of Counseling Psychology* 37: 2 (1990): 227-233.

Inglehart, Ronald. *The Silent Revolution: Changing Values and Political Styles Among Western Publics*. Princeton: Princeton University Press, 1977.

Inter-jurisdictional Regulatory Collaboration Committee. *Guidelines of the Introduction of Performance-Based Building Regulations (discussion paper)*. IRCC, May 1998. http://www.irccbldingregulations.org/pbbr_doc.html (accessed May 11, 2009)

Irvine, Bill. "Solid Plaster – Have We Forgotten How To Do It?" *Build* (February 1995): 10-14.

Isaacson, Peter. "Pollutant Regulation and Public Sensibility." *Environmental Impact Assessment Review* 6 (1986): 229-232.

Iversen, Eric J. "Raising Standards: Innovation and the Emerging Global Standardization Environment for ICT" STEP Working Paper series A-02, 2000. The STEP Group, Studies in Technology, Innovation and Economic Policy, Gruppen, October 2000.

Jepperson, R. L. "Institutions, Institutional Effects, and Institutionalism." In *The New Institutionalism in Organizational Analysis*, edited by Walter W. Powell and Paul J. DiMaggio, 143-163. Chicago: University of Chicago Press, 1991.

Joerges, Christian. "Paradoxes of Deregulatory Strategies at Community Level: The Example of Product Safety Policy." In *Deregulation or Re-Regulation? Regulatory Reform in Europe and the United States*, edited by Giandomenico Majone, 177-179. London: Pinter Publishers, 1990.

Joint EPA/State Agreement To Pursue Regulatory Innovation. [Federal Register: May 5, 1998 (Volume 63, Number 86)] <http://www.epa.gov/EPA-GENERAL/1998/May/Day-05/g11799.htm> (accessed April 16, 2008).

Jordan, A. J., and T. O'Riordan. "The Precautionary Principle in the UK Environmental Law and Policy." In *UK Environmental Policy in the 1990s*, edited by T. Grey. London: MacMillan, 1995.

Kagan, Robert A. "Regulatory Enforcement." In *Handbook of Regulation and Administrative Law*, edited by David H. Rosenbloom and Richard D. Schwartz. New York: M Decker, 1994.

Kagan, Robert A. "Should Europe Worry about Adversarial Legalism?" *Oxford Journal of Legal Studies* 17: 2. (1998): 165-183.

Kahneman, Daniel. "Maps of Bounded Rationality: Psychology for Behavioral Economics." *The American Economic Review* 93: 5 (December 2003): 1449-1475.

Kantrowitz, A. "Proposal for an Institution for Scientific Judgment." *Science* 156: 3776 (May 1967): 763-764.

Kasperson, Roger E., and Pieter Jan M. Stallen (eds.) *Communicating risks to the public*. Dordrecht: Kluwer, 1991.

Kay, John and John Vickers. "Regulatory Reform: An Appraisal." In *Deregulation or Re-Regulation? Regulatory Reform in Europe and the United States*, edited by Giandomenico Majone, 233-241. London: Pinter Publishers, 1990.

Kekes, John. *Moral Wisdom and Good Lives*. Ithaca: Cornell University Press, 1995.

Kerwin, Cornelius M. "The Elements of Rule-Making" In *Handbook of Regulation and Administrative Law*, edited by David H. Rosenbloom and Richard D. Schwartz. New York: M. Decker, 1994.

King, Nancy M. P. "The Line Between Clinical Innovation and Human Experimentation." *Seton Hall Law Review* 32 (2002): 573-582

Kitchener, Karen Strohm, and Helen G. Brenner. "Wisdom and Reflective Judgment: Knowing in the Face of Uncertainty." In *Wisdom: Its Nature, Origins, and Development*, edited by Robert J. Sternberg, 212-227. Cambridge: Cambridge University Press, 1990.

Knowles, C. C., and P. H. Pitt. *The History of Building Regulation in London 1189-1972*. London: Architectural Press, 1972.

KPMG Consulting Pty. Ltd. Report prepared for the Australian Building Codes Board on *Impact Assessment of Major Reform Initiatives*. February 24, 2000. www.abcb.gov.au (accessed May 12, 2009).

Kraft, Michael E., and Norman J. Vig. "Evaluating Technology through Public Participation. The Nuclear Waste Disposal Controversy." In *Technology and Politics*, edited by Michael E. Kraft and Norman J. Vig. Durham: Duke University Press, 1988.

Kubasek, Nancy K., and Gary S. Silverman. *Environmental Law (3rd ed)*. Upper Saddle River, NJ: Prentice Hall, 2000.

Lanoie, P., L. Laurent-Lucchetti, N. Johnstone, and S. Ambec. "Environmental Policy, Innovation and Performance: New Insights on the Porter Hypothesis." Working Papers 200706, Grenoble Applied Economics Laboratory (GAEL), 2007.

Lave, L. B. "Health, Safety, and Environmental Regulations." In *Setting National Priorities: Agenda for the 1980s*, edited by Joseph A. Pechman. Washington, D.C.: The Brookings Institution, 1980.

Lawler, Edward E., Allan M. Mohrman, Susan A. Mohrman, Thomas G. Cummings, Gerald Ledford. *Doing Research that is Useful for Theory and Practice*. Lanham: Lexington Books, 1985.

Laws, David and Ian J. Finlayson. "Reframing Regulation: Changing Forms of Law and Practice in U.S. Environmental Policy." The Environmental Technology and Public Policy Program. Department of Urban Studies and Planning, Massachusetts Institute of Technology. October 12, 2004. http://web.mit.edu/dusp/etpp/content/publications/pdfs/2004-laws_finlayson.pdf (accessed May 26, 2009). Subsequently published as: Laws, David and Ian J. Finlayson. "Reframing Regulation: Changing Forms of Law and Practice in U.S. Environmental Policy." In *Meervoudig ruimtegebruik [Multifunctional Planning]*, edited by J. van der Heijden and A. Slob, Delft, Netherlands: Eburon, 2005.

Laws, David, and Matthew Amengual. "Analysis of the Development of the Dairy Gateway and Green Tier." The Environmental Technology and Public Policy Program. Department of Urban Studies and Planning, Massachusetts Institute of Technology. September 29, 2004. http://web.mit.edu/dusp/etpp/content/publications/pdfs/2004-laws_amengual.pdf (accessed May 26, 2009).

Leebron, David W. "Lying Down with Procrustes: An Analysis of Harmonization Claims." In *Fair Trade and Harmonization: Prerequisites for Free Trade?* Edited by Jagdish N. Bhagwati and Robert E. Hudec. Cambridge, MA: MIT Press, 1996.

Legislation Advisory Committee. *Guidelines on Process and Content of Legislation*. 2001 edition and amendments. Can be found at <http://www.justice.govt.nz/lac/index.html>.

Lehrer, Keith, and Nicholas D. Smith. "Knowledge, Teaching and Wisdom." In *Knowledge, Teaching and Wisdom*, edited by Keith Lehrer, B. Jeannie Lum, Beverly A. Slichta, and Nicholas D. Smith. Dordrecht: Kluwer Academic Publishers, 1996.

Lenox, Michael, and Andrew King. "Prospects for Developing Absorptive Capacity through Internal Information Provision." *Strategic Management Journal* 25: 4 (2004): 331-345.

Levi, Margaret. *Of Rule and Revenue*. Berkeley and London: University of California Press. 1988

Lodge, Martin. "Competition, Innovation and Regulation: The Regulatory State and Policy Failure: Regulatory Regimes in Britain and Germany." Paper presented at the 51st Political Studies Association Conference, Manchester, UK, April 10-12, 2001. The author noted on the paper that it was a draft version.

Majone, Giandomenico (ed.) *Deregulation or Re-regulation? Regulatory Reform in Europe and the United States*. New York: Pinter Publishers, 1989.

Majone, Giandomenico. *Regulating Europe*. London: Routledge, 1996.

Majumdar, Sumit K. and Alfred A. Marcus. "Rules Versus Discretion: The Productivity Consequences of Flexible Regulation." *Academy of Management Journal* 44: 1 (2000): 170-189.

March, James G., and Johan P Olsen. "The New Institutionalism: Organizational Factors in Political Life." *American Political Science Review* 78: 3 (1984): 778-49.

Martin, Patricia Yancey, and Barry A. Turner. "Grounded Theory and Organizational Research." *The Journal of Applied Behavioural Science* 22: 2 (1986): 141-157.

Matheny, Albert R., and Bruce A. Williams. "Scientific Disputes and Adversary Procedures in Policy-making." *Law and Policy* 3: 3 (1981): 341-364.

May, Peter J. "Can Cooperation be Mandated? Implementing Intergovernmental Environmental Management in New South Wales and New Zealand." *Publius, The Journal of Federalism* 25: 1 (1995): 89-114.

May, Peter J. "Mandate Design and Implementation: Enhancing Implementation Efforts and Shaping Regulatory Styles." *Journal of Policy Analysis and Management* 12: 4 (1993): 634-663.

May, Peter J. "Performance-Based Regulation and Regulatory Regimes: The Saga of Leaky Buildings." *Law and Policy* 25: 4 (2003): 381-401.

May, Peter J. "Regulatory Regimes and Accountability." *Regulation & Governance* 1: 1 (2007): 8-26.

May, Peter J. "Social Regulation." In *Tools of Government: A Guide to the New Governance*, edited by Lester M. Salamon. New York: Oxford University Press. 2002

May, Peter J. "Societal Perspectives about Earthquake Performance: The Fallacy of 'Acceptable Risk'". *Earthquake Spectra* 17: 4 (November 2001): 725-737.

May, Peter J., and Raymond J. Burby. "Making Sense Out of Regulatory Enforcement." *Law and Policy* 20: 2 (1998): 157-182.

May, Peter J., and Robert S. Wood. "At the Regulatory Front Lines: Inspectors' Enforcement Styles and Regulatory Compliance." *Journal of Public Administration Research and Theory* 13: 2 (2003): 117-139.

May, Peter J., and Soren Winter. "Reconsidering Styles of Regulatory Enforcement: Patterns in Danish Agro-Environmental Inspection." *Law and Policy* 22: 2 (2000): 143-173.

May, Peter J., Raymond J. Burby, Neil J. Ericksen, John W. Handmer, Jennifer E. Dixon, Sarah Michaels, and D. Ingle Smith. *Environmental Management and Governance: Intergovernmental Approaches to Hazards and Sustainability*. London and New York: Routledge, 1996.

McConkey, Michael. *Thinking Regulation: A Roadmap to the Recent Periodical Literature*. Prepared for the Privy Council Office of the Government of Canada, September 2003.

McCubbins, Mathew D., Roger D. Noll, Barry R. Weingast. "Structure and Process, Politics and Policy: Administrative Arrangements and the Political Control of Agencies." *Virginia Law Review* 75: 2 (1989): 431-482.

McLean, Iain, and Christopher D. Foster. "The Political Economy of Regulation: Interests, Ideology, Voters and the UK Regulation of the Railways Act 1844." *Public Administration* 70: 3 (1992): 313-331.

Meacham, Brian J. "Concepts of a Performance-Based Building Regulatory System for the United States." *NIST GCR 98-762*. NIST: Gaithersburg, MD, 1988.

Meacham, Brian J. "Identifying and Regulating for Multiple Levels of Performance." Paper presented at the CIB World Building Congress: Performance in Product and Practice, Wellington, New Zealand, April 2001.

Meacham, Brian J. "Integrating Human Factors Issues Into Engineered Fire Safety Design." *Fire and Materials* 23: 6 (1999): 273-279.

Meacham, Brian J. *The Evolution of Performance-Based Codes and Fire Safety Design Methods*. NIST GCR 98-761. NIST: Gaithersburg, MD, 1998.

Meacham, Brian J., Beth Tubbs, Denis Bergeron, and Francois Szigeti. Performance Systems Model – A Framework for Describing the Totality of Building Performance. *Proceedings of the CIB-CTBUH International Conference on Tall Buildings*. Malaysia 20-23, 2003.

Meacham, Brian J., Robert Bowen, Jon Traw, and Amanda Moore. "Performance-based Building Regulation: Current Situation and Future Needs." *Building Research and Information* 33: 2 (March-April 2005): 91-106.

Meyer, John W., and Brian Rowan. "Institutionalised Organisations: Formal Structure as Myth and Ceremony." *American Journal of Sociology* 83: 2 (1977): 340-363.

Ministry of Economic Development. *Discussion Document – Better Regulation of the Building Industry in New Zealand: Discussing the Options*. Wellington, New Zealand, March 2003.

Minnesota Pollution Control Agency. *1998 Project XL Report to the Minnesota Legislature*. Minnesota Pollution Control Agency, January 9, 1998.
http://proteus.pca.state.mn.us/programs/projectxl/xl_rpt98.pdf (accessed December 18, 2006)

Mishlove, Jeffrey. Transcript of an interview with Hubert Dreyfus. From the series "Thinking Allowed, Conversations On the Leading Edge of Knowledge and Discovery." <http://www.intuition.org/txt/dreyfus.htm> (accessed July 4, 2007).

Mitnick, B. *The Political Economy of Regulation*. New York: Columbia University Press, 1980.

Moe, Terry M. "Political Institutions: The Neglected Side of the Story." *Journal of Law, Economics, and Organization* 6: 0 (1990): 213-253.

Moran, Emilio, Elinor Ostrom, and J. C. Randolph. "A Multilevel Approach to Studying Global Environmental Change in Forest Ecosystems." Paper presented at the Earth's Changing Land, GCTE-LUCC Open Science Conference on Global Change, Barcelona, Spain, March 14-18, 1998. <http://www.cipec.org/publications/abstracts98.html> (accessed May 26, 2009).

Multi State Working Group on Environmental Performance. Introduction to a session on “Examples of Alternative Legal Frameworks” at the International Dialogue on Ecological Policy, the annual conference and workshop presented by the Multi-State Working Group on Environmental Performance at Madison, Wisconsin June 17-20, 2007.
http://www.desertroseenv.com/MSWG2007_files/Page999.htm (accessed May 12, 2009).

Multi-State Working Group on Environmental Performance, University of Massachusetts Lowell and Regulatory Policy Program, Mossavar-Rahmani Center for Business and Government, John F. Kennedy School of Government, Harvard University. *Environmental Innovation: A Dialogue on the Role of Government, Law and Regulatory Approaches*, March 31, 2005. Dialogue Summary, January 2006.
http://www.mswg.org/documents/Academy/FINAL_Laws_n_Regs_report.pdf (accessed May12, 2009)

Murphy, Colin. “Cladding defects study.” *Build* (September/October 2001): 8.

Nelkin, D., and M. Pollak. “Public Participation in Technological Decisions: Reality or Grand Illusion?” *Technology Review* 81: 8 (1979): 55-64.

New Zealand Parliamentary Debates (Hansard). Vol. 510 and 520.

Nisbett, Richard E. and Lee Ross. *Human Inference: Strategies and Shortcomings of Social Judgment*. Englewood Cliffs, NJ: Prentice-Hall, 1980.

North, Douglass C. *Understanding the Process of Economic Change*. Princeton: Princeton University Press, 2005.

O’Sullivan. Philip. “Cavities Are Here To Stay.” Weathertightness News 6 (April 2004): www.building.dbh.govt.nz (accessed July 7, 2006)

OECD. *OECD Review of Regulatory Reform: Regulatory Policies in OECD Countries*. Paris: OECD, 2002.

OECD. *Reducing the Risk of Policy Failure: Challenges for Regulatory Compliance*. OECD, Paris, 2000.

OECD. *The OECD Report on Regulatory Reform Synthesis*. OECD, Paris, 1997.

Office of Technology Assessment. *Environmental Policy Tools: A User’s Guide*. OTA-EVN-634. Washington D.C: U.S. Government Printing Office, 1995.

Office of the Review of Planning and Building Controls. *Review of Planning and Building Controls: Discussion Document*. Wellington, New Zealand. May 31, 1983.

Office of the Review of Planning and Building Controls. *Review of Planning and Building Controls: Discussion Document*. Wellington, New Zealand. May 11, 1984.

Ogus, Anthony I. "Evaluating Alternative Regulatory Regimes: The Contribution of 'Law and Economics'" *Geoforum* 30: 3 (1999): 223-229.

Ogus, Anthony I. *Regulation: Legal Form and Economic Theory*. Oxford: Clarendon Press, 1994.

Olson, Mancur. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge, MA: Harvard University Press, 1965.

Oregon State University. *Adaptive Management*.
<http://oregonstate.edu/instruction/anth481/ectop/ecadm.html> (accessed April 10, 2008).

Orsman, Bernhard. "Stressful Wait for 80,000 Leaky Home Victims." *New Zealand Herald*, October 10, 2007.

Oster, Saron M., and John M. Quigley. Regulatory Barriers to the Diffusion of Innovation: Some Evidence from Building Codes. *Bell Journal of Economics* 8: 2 (1977): 361-377.

Ostrom, Elinor. "A Behavioral Approach to the Rational-Choice Theory of Collective Action." *American Political Science Review* 92: 1 (1997): 1-22.

Otway, Harry. "Experts, Risk Communication, and Democracy." *Risk Analysis* 7: 2 (1987): 125-29.

Overview Group. *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority*. Wellington, New Zealand: August 31, 2002.

Overview Group. *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority – Addendum: Section 3*. Wellington, New Zealand: October 31, 2002.

Paddock, Lee. Notes from the Editor: Mainstreaming Leadership Programs. *Innovation, Management Systems and Trading Committee Newsletter* 5:2, August 2005.

Palmer, Geoffrey, and Matthew Palmer. *Bridled Power: New Zealand Government under MMP* (3rd ed.). Auckland: Oxford University Press, 1997.

Palmer, Matthew S. R. "New Zealand Constitutional Culture." *New Zealand Universities Law Review* 22 (2007): 565-597.

Pandit, Naresh R. "The Creation of Theory: A Recent Application of the Grounded Theory Method." *The Qualitative Report* 2: 4 (1996).

Pateman, Carole. *Participation and Democratic Theory*. Cambridge: Cambridge University Press, 1970.

Peltzman, S. The Economic Theory of Regulation after a Decade of Deregulation. *Brookings Papers on Economic Activity, Microeconomics*, 1989: 1-41.

Perrow, Charles. *Normal Accidents: Living with High-Risk Technologies*. New York: Basic Books, 1984.

Pham, L. Actions on Structures: Regulations and Standards. *CSIRO Sustainable Ecosystems, EJSE Special Issue: Loading on Structures*. 2007

Picciotto, Sol. "Regulatory Networks and Global Governance." In W. G. Hart Legal Workshop, 27-29 June 2006, London. (Unpublished). <http://eprints.lancs.ac.uk/232> (accessed May 12, 2009).

Pidgeon, Nick, and Karen Henwood, "Using Grounded Theory in Psychological Research." In *Doing Qualitative Analysis in Psychology*, edited by Nicky Hayes, 245-273. Hove, East Sussex: Psychology Press, 1997.

Plough, A., and S. Krimsky. "The Emergence of Risk Communication Studies: Social and Political Context." *Science, Technology, and Human Values* 12: 3 & 4 (1987): 4-10

Porter, Michael E., and Claas van der Linde. "Toward a New Conception of the Environment-Competitiveness Relationship." *Journal of Economic Perspectives* 9: 4 (1995): 97-118.

Posner, Richard A. *Catastrophe: Risk and Response*. Oxford: Oxford University Press, 2004.

Powell, Walter W., and Paul J. DiMaggio (eds.) *The New Institutionalism in Organizational Analysis*. Chicago: University of Chicago Press, 1991.

Prakash, Aseem, and Matthew Potoski. *The Voluntary Environmentalists: Green Clubs, ISO 14001, and Voluntary Regulations*. Cambridge University Press, 2006.

Quirk, Paul J. *Industry Influence in Federal Regulatory Agencies*. Princeton, NJ: Princeton University, 1981.

Read, Deborah. "Report on Copper, Chromium and Arsenic (CCA) Treated Timber." Report prepared for ERMA. Wellington, New Zealand, 2003.
<http://www.ermanz.govt.nz/resources/publications/pdfs/cca-report.pdf>. (accessed April 8, 2008).

Reason, James. *Human Error*. Cambridge. Cambridge University Press. 1990.

Regulation Taskforce. *Rethinking Regulation: Report of the Taskforce on Reducing Regulatory Burdens on Business*, Report to the Prime Minister and the Treasurer. Canberra, January 2006.

Repetto, R. (ed) *Punctuated Equilibrium and the Dynamics of U.S. Environmental Policy*. New Haven, Conn: Yale University Press, 2006.

Robens, Lord (Chairman). *Safety and Health at Work: Report of the Committee 1970-72*. London: HMSO, 1972.

Rosenbloom, David H. 'The Evolution of Administrative State and Transformations of Administrative Law, In *Handbook of Regulation and Administrative Law*, edited by David H. Rosenbloom and Richard D. Schwartz. New York: M. Decker, 1994.

Rosenbloom, David H., and Richard D. Schwartz (eds.) *Handbook of Regulation and Administrative Law*. New York: M. Decker, 1994.

Ross, Philip E. "The Expert Mind." *Scientific America*, July 24, 2006.

Rowe, William D. *An Anatomy of Risk*. New York: John Wiley & Sons, 1977.

Ruzza, Renato Di, and Joseph Halevi. "How to Look at Economics Critically: Some Suggestions." In *A Guide to What's Wrong with Economics*, edited by Edward Fullbrook. Anthem Press, 2004.

Salamon, Lester M. (ed.) *The Tools of Government: A Guide to the New Governance*. New York, NY: Oxford University Press, 2002.

Samuelson, Paul A. "The Pure Theory of Public Expenditure." *The Review of Economics and Statistics* 36: 4 (1954): 387-89.

Sapolsky, Harvey M, (ed.) *Consuming Fears: The Politics of Product Risks*. New York: Basic Books, 1986.

Saul, John Ralston. *The Unconscious Civilization*. Australia: Penguin Books, 1997.

Scarry, John. An Open Letter to IPENZ Regarding the Parlous State of the Structural Engineering Profession and Construction Industry in New Zealand. December 2002.

Schauer, Frederick. "The Convergence of Rules and Standards." In *The Statute: Making and Meaning*. Edited By Rick Bigwood. Wellington: LexisNexis. 2004.

Scheberle, Denise. *Federalism and Environmental Policy: Trust and the Politics of Implementation*. Washington D.C.: Georgetown University Press, 1977.

Schleafer, M. W. "Wisconsin's Green Tier Leadership Program." *Innovation, Management Systems and Trading Committee Newsletter* 5, no2, August 2005.

Scholz, John T. "Cooperation, Deterrence, and the Ecology of Regulatory Enforcement." *Law and Society Review* 18: 2 (1984): 179-224.

Scholz, John T. "Managing Regulatory Enforcement." In *Handbook of Regulation and Administrative Law*, edited by David H. Rosenbloom and Richard D. Schwartz. New York: M. Decker, 1994.

Schwartz, Alan, and Louis L. Wilde. "Intervening in Markets on the Basis of Imperfect Information: A Legal and Economic Analysis." *University of Pennsylvania Law Review* 127 (1978).

Scott, Richard W. "The Adolescence of Institutional Theory." *Administrative Science Quarterly* 32: 4 (1987): 493-511.

Seidman, Irving. *Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences*. 3rd ed. New York: Teachers College Press, 2006.

Shapiro, Sidney A., and Randy S. Rabinowitz. "Punishment versus Cooperation in Regulatory Enforcement: A Case Study of OSHA." *Administrative Law Review* 49 (1997): 713-762.

Shaw, Peter. *A History of New Zealand Architecture*, 3rd ed. Auckland, NZ: Hodder Moa Beckett, 1997.

Shearing, C. A Constitutive Conception of Regulation. In *Business Regulation and Australia's Future*, edited by Peter Grabosky and John Braithwaite. Canberra: Australian Institute of Criminology, 1993.

Shepsle, Kenneth A. "Institutional Equilibrium and Equilibrium Institutions." In *Political Science: The Science of Politics*, edited by Herbert F. Weisburg. New York: Agathon Press, 1986.

Shi, Song. "An Analysis of Leaky Home Stigma Impacts on Residential Property Values." A Research Report presented in Partial Fulfilment of the Requirement for the Master of Business Studies at Massey University, 2003.

Shrader-Frechette, K. S. *Risk Analysis and Scientific Method*. Boston, MA, D. Reidel Publishing Company, 1985.

Simon, Herbert A. "Human Nature in Politics: The Dialogue of Psychology with Political Science." *American Political Science Review* 79: 2 (1985): 293-304.

Simon, Herbert A. *Models of Bounded Rationality: Empirically Grounded Economic Reason*. Cambridge, MA: MIT Press, 1997.

Skidelsky, Robert. *John Maynard Keynes: Hopes Betrayed 1883-1920*. London: MacMillan, 1983.

Slife, Brent D., and Richard N. Williams. *What's behind the research?: Discovering hidden assumptions in the behavioural sciences*. Thousand Oaks CA: Sage Publications, 1995.

Slovic, P. "Perception of Risk." *Science* 236: 4799 (1987): 280–285.

Smith, Ed, and Richard Reeves. "Papering Over the Cracks? – Rules, Regulation and Real Trust." *Provocation Series* 2: 1 (February 2006).

Smith, Jacqui, and Paul B. Baltes. "Wisdom-related Knowledge: Age/Cohort Differences in Response to Life-planning Problems." *Developmental Psychology* 26: 3 (1999): 494-504.

Sosniak, L. A. "Phases of Learning". In *Developing Talent in Young People*. Benjamin S. Bloom, and Lauren A. Sosniak, 409. New York: Ballantine Books, 1985.

Sparrow, Malcolm K. *The Regulatory Craft: Controlling Risks, Solving Problems, and Managing Compliance*. Washington DC: Bookings Institution Press, 2000.

Stanford Encyclopaedia of Philosophy. <http://plato.stanford.edu/entries/wisdom> (accessed February 1, 2008).

Starbuck, William H. *The Production of Knowledge*. Oxford: Oxford University Press, 2006.

Starbuck, William. H., and Francis J. Milliken. "Challenger: Fine-tuning the Odds until Something Breaks." *Journal of Management Studies* 25: 4 (1988): 319-340.

Starr, C. "Social Benefit versus Technological Risk." *Science* 165: 899 (1969): 1232-1238.

Staudinger, U. M. "Wisdom and the Social-Interactive Foundation of the Mind." In *Interactive Minds: Life-span Perspectives on the Social Foundation of Cognition*, edited P. B. Baltes and U. M. Staudinger, 276-315. Cambridge, England: Cambridge University Press, 1996.

Staudinger, U. M. and P. B. Baltes. "Interactive Minds: A Facilitative Setting for Wisdom-related Performance?" *Journal of Personality and Social Psychology* 71 (1996): 746-762.

Steinzor, R. I. "Myths of the Reinvented State." *Capital University Law Review* 29 (2001): 223-243.

Stern, Paul C., and Harvey V. Fineberg (eds.) *Understanding Risk: Informing Decisions in a Democratic Society*. Washington, D.C: National Academy Press, 1996.

Sternberg, R. J. "A Balance Theory of Wisdom." *Review of General Psychology* 2 (1998): 347-365.

- Stewart, Richard B. "Regulation and the Crisis of Legalisation in the United States." In *Law as an Instrument of Economic Policy: Comparative and Critical Approaches*, edited by Terence Daintith, 102-103. Berlin: Walter de Gruyter, 1988.
- Strauss, Anselm C., and Juliet Corbin (eds.) *Grounded theory in practice*. Thousand Oaks CA: Sage Publications, 1997.
- Sunstein, Cass R. *After the Rights Revolution*. Cambridge Massachusetts: Harvard University Press, 1990.
- Sunstein, Cass R. *Infotopia: How Many Minds Produce Knowledge*. New York: Oxford University Press, 2006.
- Sunstein, Cass R. *Laws of Fear: Beyond the Precautionary Principle*. Cambridge: Cambridge University Press, 2005.
- Sunstein, Cass R., and Richard H. Thaler. "Libertarian Paternalism Is Not An Oxymoron." Working Paper 03-02. AEI-Brookings Joint Center for Regulatory Studies, April 2003.
- Surowiecki, James. *The Wisdom of Crowds. Why the Many are Smarter than the Few and How Collective Wisdom Shapes Business, Economies, Societies, and Nations*. London: Little, Brown, 2004.
- Susskind, Lawrence E., and Joshua Secunda. "The Risks and Advantages of Agency Discretion: Evidence From EPA's Project XL." *UCLA Journal of Environmental Law and Policy* 17: 1 (1998/99).
- Sutherland, John. "Systemic Problems: Systemic Solutions." Paper presented at the NZIA Conference, Auckland, New Zealand, May 2003.
- Taylor, Cliff. "Leak Crisis Could Cost \$11 b." *New Zealand Herald*, July 20, 2008.
- Taylor, Steven J., and Robert Bogdan. *Introduction to Qualitative Research Methods: a Guidebook and Resource*, 3rd ed. New York: John Wiley & Sons, 1998.
- Tetlock, Philip E. *Expert Political Judgement: How Good Is It? How Can We Know?* Princeton: Princeton University Press, 2005.
- Teubner, Gunther (ed.). *Autopoietic Law: A New Approach to Law and Society*. Berlin: Walter de Gruyter, 1988.
- Teubner, Gunther. "Substantive and Reflexive Elements in Modern Law." *Law & Society Review* 17 (1983): 239-285.
- The Financial Services Authority. *Principles-based Regulation: Focusing on the Outcomes that Matter*. The Financial Services Authority, London, 2007.

The Fire Protection Research Foundation. *The Recommendations of The Research Advisory Council on Post-fire Analysis: A White Paper*. Quincy, Massachusetts: The Fire Protection Research Foundation, February 2002.

The Institution of Professional Engineers New Zealand Incorporated (IPENZ). *Report of the Structural Engineering Taskforce Enquiring Into the State of Practice in Structural Engineering in New Zealand*. Wellington: IPENZ, 2003.
http://www.ipenz.org.nz/ipenz/PracticeSupport/Task_Force_Report_final.pdf (accessed May 12, 2009).

Thelen, Kathleen and Sven Steinmo. "Historical Institutionalism in Comparative Politics." In *Structuring Politics*, edited by Sven Steinmo, Kathleen Thelen and Frank Longstreth. Cambridge: Cambridge University Press, 1992.

Thompson, Dennis F. *The Democratic Citizen: Social Science and Democratic Theory in the Twentieth Century*. Cambridge: Cambridge University Press, 1970.

Tofler, Alvin. *Future Shock*. London: Pan Books Ltd. 1971.

Trubek, David M., and Louise G. Trubek. *The Coexistence of New Governance and Legal Regulation: Complementarity or Rivalry?* Paper Presented at the Annual Meeting of the Research Committee on the Sociology of Law, Paris, July 2005.

Turvey, Calum G., and Eliza M. Mojduszka. "The Precautionary Principle and the Law of Unintended Consequences." *Food Policy* 30: 2 (April 2005): 145-161.

Tyran, Jean-Robert, and Lars P. Feld. "Achieving Compliance when Legal Sanctions are Non-Deterrent." CREMA Working Paper Series 2005-17, Center for Research in Economics, Management and the Arts (CREMA), 2005.

United States General Accounting Office. *Environmental Protection - Overcoming Obstacles to Innovative State Regulatory Programs*. GAO-02-268, January 2002.

Van Eck G., U Pino, A. M. Martin, H. Gewalt, A. Harris. "Inherent defect Insurance." Paper presented to the International Association of Engineering Insurers (IMIA) Conference (IMIA WGP14 (01)E), Sydney, Australia, September 2001. Found at:
http://www.imia.com/downloads/imia_papers/wgp14_2001.pdf (accessed April 25, 2009).

Vanberg, Viktor. "Hayek's Legacy and the Future of Liberal Thought: Rational Liberalism Verses Evolutionary Agnosticism." *The Cato Journal* 14: 2 (1994).

Vibert, Frank. "The Limits of Regulatory Reform in the EU." *Economic Affairs* 26: 2 (June 2006): 17-21.

Vickers, Geoffrey. *The Art of Judgment: a Study of Policy Making*. Thousand Oaks: Sage Publications, 1995.

Vickers, Ian, Philip James, David Smallbone, and Robert Baldock. "Understanding Small Firm Responses to Regulation: The Case of Workplace Health and Safety." *Policy Studies* 26: 2 (2005): 149-169.

Vogel, David. *Barriers or Benefits? Regulation in Transatlantic Trade*. Washington D.C: Brookings Institute Press, 1997.

Vogel, David. *National Styles of Regulation: Environmental Policy in Great Britain and the United States*. Ithaca, New York: Cornell University Press, 1986.

Vogel, David. *The New Politics of Risk Regulation in Europe*. London: The London School of Economics and Political Science, 2001.

Waldron, Jeremy. *The Dignity of Legislation*. Cambridge: Cambridge University Press, 2007.

Weber, Edward P. *Pluralism by the Rules: Conflict and Cooperation in Environmental Regulation*. Washington, D.C: Georgetown University Press, 1998.

Wiener, Jonathan Baert. "Managing the Iatrogenic Risks of Risk Management." *Risk: Health, Safety & Environment* 9:39 (1998): 39-82.

Wildavsky, Aaron. *But Is it True: A Citizen's Guide to Environmental Health and Safety Issues*. Cambridge, MA: Harvard University Press, 1995.

Wilkinson, Bryce. *Constraining Government Regulation*. New Zealand Business Roundtable, 2001.

Wilkinson, Sara J. *Perceived Deficiencies and the Policing of the Building Regulations: An Australian Perspective*. Strategic Integration of Surveying Services, FIG Working Week 2007. Hong Kong SAR, China, May 13-17, 2007.

Wilson, J. Q. "The Politics of Regulation." In *The Politics of Regulation*, edited by J. Q. Wilson. New York: Basic Books, 1980.

Wilthagen, T. "Reflexive Rationality in the Regulation of Occupational Health and Safety." In *Reflexive Labour Law*, edited by R. Rogowshi and T. Wilthagen. Kluwer, Deventer, 1994.

Wise, C. R. "Regulatory Takings." In *Handbook of Regulation and Administrative Law*, edited by David H. Rosenbloom and Richard D. Schwartz, 73-90. New York: M. Decker, 1994.

Wolf, Amanda. "Policy Thinking: From 'If ... Then' to 'What If ...'." *Policy Quarterly* 2: 3 (2006): 14-23.

Wolf, Amanda. "Research Strategies for Policy Relevance." *Social Policy Journal of New Zealand* 23 (2004): 65-85.

Wolski, Armin, Nicholas A. Dembsey, Brian J. Meacham. "Accommodating Perceptions of Risk in Performance-Based Building Fire Safety Code Development." *Fire Safety Journal* 34: 3 (2000): 297-309.

Woodhouse, Edward J. "Sophisticated trial and error in decision making about risk." In *Technology and Politics*, edited by Michael E. Kraft and Norman J. Vig. Durham: Duke University Press, 1988.

WTO. *The WTO Agreement on Technical Barriers to Trade*.

Yin, Robert K. *Case Study Research: Design and Methods* (2nd ed.). Thousand Oaks: Sage Publications, 1994.