POLICY Quarterly

IN FOCUS
Regulatory Issues

Editorial Note

This issue of *Policy Quarterly* commences with five articles on aspects of government regulation in New Zealand. A separate editorial note (see below) by Dr Peter Mumford and Keith Manch summarizes the purpose and content of these articles. My sincere thanks to Peter and Keith, and also Dr Veronica Jacobsen, for their efforts in overseeing the selection, preparation and peer review of these articles. Collectively, these pieces provide a fascinating insight into the evolving nature of public regulation in this country, not least the important quest for better regulatory stewardship and improved regulatory practice.

The remaining eight articles fall into two categories. First, there are five articles on various topical policy issues from a range of (mostly academic) contributors. These cover the following matters: the ethical, societal and policy implications of artificial intelligence; the extent of income volatility in New Zealand; trends in top pay in New Zealand; ways to enhance education on civics and citizenship; and the implications of climate change for household insurance.

The final three articles are from students in the Graduate Pathway Programme in the School of Government: Alice Denne, Matthew Macfarlane and Danijela Tavich. These articles are based on research undertaken by these students as part of their internships with various public and non-governmental agencies. This is the first time *Policy Quarterly* has published such material, but I trust it will not be the last. My grateful thanks to Dr Barbara Allen, who coordinates our School's Graduate Pathway Programme, for suggesting the idea of having these students contribute to the journal and for overseeing the preparation of their articles.

New Zealand has a new government. The February issue of *Policy Quarterly* will, accordingly, include reflections on the political and policy implications of the change of government. In the meantime, I trust that readers will find much of interest in the November issue.

Jonathan Boston

Articles on regulatory issues

This issue of *Policy Quarterly* continues the regulatory theme that has emerged over the past couple of years. This recognises the critical role that regulation plays in maintaining a society where people are safe and secure, and an economy that supports growth and prosperity. Recent regulatory failures have graphically demonstrated the costs when regulation does not deliver on its promises, and parliament has 'upped the game', by requiring under the State Sector Act that chief executives exercise 'stewardship' over the legislation administered by their agency.

The five regulatory articles traverse a number of issues. Two are conceptual. The first, by Stephanie Winson, argues that regulators have a lot of value to offer in the policy development and review process. You may or may not agree with Winson's assertion that policy analysts may 'dismiss or may not appreciate' the real world of regulatory compliance. However, she makes a compelling argument that regulators have unique insights that can be exploited through good leadership and collaboration across regulatory systems, underpinned by effective information management and competency.

Ben Wauchop and Keith Manch tackle the contentious subject of whether regulated entities (those who are required to comply with the law) are 'customers' of the agencies that are regulating them. Does it matter what they are called? In his seminal work on the philosophy of language, Wittgenstein concluded that 'Different words create different worlds'. From this perspective it does matter as both regulators and those they regulate may condition their behaviours based on what they understand the term 'customer' to mean.

A further two articles provide insights into the regulatory practice world. Both deal with critical infrastructures – ports and rail, and both deal with safety. The quest for better regulatory outcomes can involve experimentation and the ports and rail safety stories show how the regulatory regimes have evolved based on what both the regulators and regulated entities have learned from experience.

Keith Manch emphasises the features of co-regulation that align the mandates, incentives and capabilities of the national regulator, local government regulators and port companies. Chris Ballantyne shows how the regulator first had to recognise the need and then change its regulatory culture, capabilities and 'rules of thumb' to implement effectively the safety case approach that was introduced through legislative change in 2005.

Finally, New Zealand has implemented the most modern regime for regulating outer space activities and high altitude vehicles originating from its territory. Kirsty Hutchison, Katherine MacNeill, Peter Mumford and Val Sim describe this regime and what it seeks to achieve. Put into the context of regulating disruptive technologies and markets so that the benefits are secured while managing the risks, this article puts a stake in the ground for a permissive approach which facilitates innovation and entrepreneurship, but with rigorous checks and balances to ensure that what is permitted is safe and secure.

Keith Manch and **Peter Mumford** on behalf of the Government Regulatory Practice Initiative (G-REG). With thanks to Dr Veronica Jacobsen for her contribution to the editorial review of the five articles.

Stephanie Winson

REGULATORY STEWARDSHIP
Voice of the Regulator

In 2014 the New Zealand Productivity Commission inquiry on regulatory institutions and practices concluded that 'The performance of New Zealand's regulatory system is in need of improvement – in particular around developing and maintaining the capability needed to effectively implement regulation and the need to oversee and manage the overall system' (Productivity Commission, 2014, p.2). Since then there has been much talk of regulatory stewardship. This article considers what it is and the importance of the role of the regulator in achieving it.

Regulatory stewardship

Regulatory stewardship is the adoption of a whole-of-system view, and a proactive, collaborative approach to the care of the regulatory system(s) within which an agency works (New Zealand Government, 2017a). It looks at systems as assets that need to be well managed to deliver effectively over time. In his 2014 article 'Why departments need to be regulatory stewards', Jonathan Ayto said the then initial government expectations for regulatory stewardship 'can be viewed as introducing some very basic asset management concepts to the regulatory environment' (Ayto, 2014, p.27).

The government issued updated expectations for regulatory stewardship when it recently published *Government Expectations for Good Regulatory Practice*, from which the above definition of regulatory stewardship is lifted. The updated expectations describe the regulatory stewardship role as including responsibility for:
· monitoring, review and reporting on existing regulatory systems;
· robust analysis and implementation support for changes to regulatory systems; and
· good regulatory practice (New Zealand Government, 2017a, p.3).

The updated expectations differ from the earlier iterations because they now contain a part B which explicitly includes a section on good regulator practice. This reflects a growing awareness that

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Figure 1: The regulatory cycle
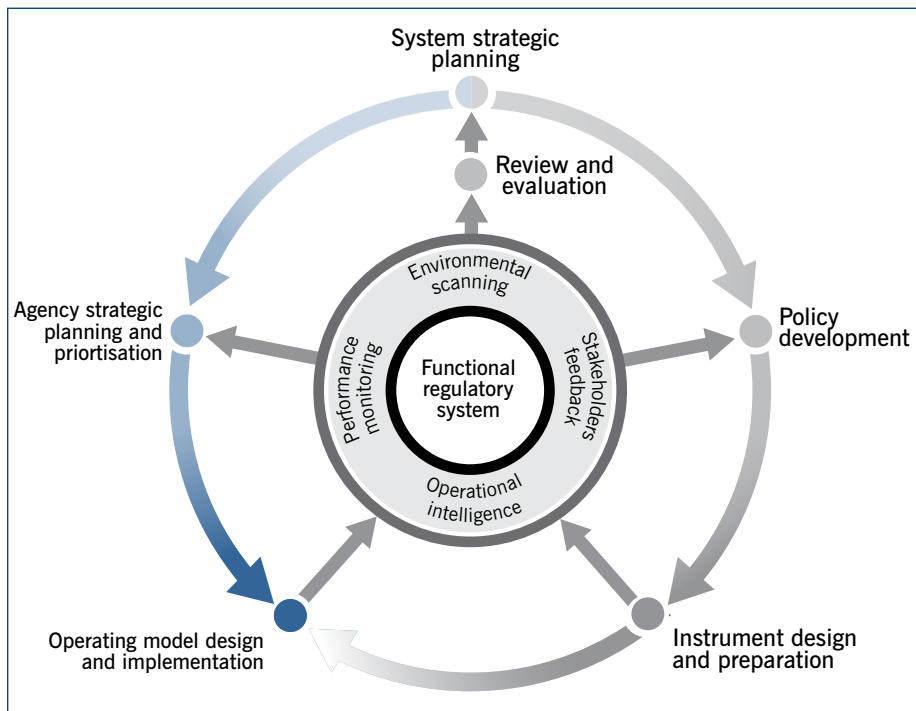
Source: New Zealand Government, 2017b, p.5

stewardship extends beyond design and review of regulatory regimes. Regulators will welcome this shift in focus because the role played by them in the success or failure of regulatory systems is well known. Julia Black's analysis of past regulatory failures makes this point very clear:

a striking feature of all the regulatory disasters analysed here is the central role played by failures of governance and leadership within organisations, in both regulators and regulated firms … Also striking are the consistent failures of organisations, particularly regulatory organisations, to coordinate in the operation of the regulatory system, failures which are exacerbated the more complex the system. (Black, 2014, pp.6-7)

It is notable that part B of the updated expectations captures all the key elements that have featured in past regulatory failures, including:
· the need to adopt a whole-of-system view;
· active collaboration between different government agencies;
· a focus on improving the quality of legislation;

· good regulatory practice and regulator competence;
· the need for ongoing monitoring of the regulatory system; and
· the need for transparent and effective engagement with stakeholders and affected parties.

At its heart, regulatory stewardship means that all parties involved in the regulatory system need to work together to ensure that the system remains fit for purpose. The key point is that regulatory systems are created to serve a defined public interest and policy agencies and regulators must collaborate to deliver the defined public interest outcomes, with due regard to the views of the public and regulated parties. This is a continuous and evolving situation which requires ongoing management and cooperation. The government's regulatory management strategy includes a diagrammatic representation of the regulatory cycle (see Figure 1) to illustrate how this should occur in a functioning regulatory system that changes and evolves.

What is a regulatory system?
Departmental regulatory strategies describe regulatory systems at regime level (such as the financial markets regulatory system or the workplace safety regulatory system). This is important because it

encompasses different sets of legislation that seek to achieve a commonly defined public interest objective. Defining the system in this way helps clarify that various agencies may have regulatory roles within the same system, which, once identified, assists with establishing who contributes to system performance.

However, it is also important to consider regulatory systems in a wider context, such as that identified by the Productivity Commission, which described it as including 'the institutions, principles and processes through which regulations are made, implemented, enforced and reviewed' (Productivity Commission, 2014, p.28). These things influence how agencies participate and engage with each other in pursuit of the defined regulatory objectives. Both perspectives support a more holistic view of the 'system' which underpins regulatory stewardship.

The missing link – the regulator
A careful review of the updated expectations and the government's regulatory management strategy reveals that they capture best practice concepts and tools to consistently manage, maintain and improve regulatory systems over time. Many existing instruments and guidelines, such as the impact analysis requirements (Cabinet Office Circular, 2017) or the Legislation Design and Advisory Committee guidelines (Legislation Design and Advisory Committee, 2014), reflect similar standards and expectations, particularly in relation to the design and review stages of regulation. In fact, most agencies should be able to easily identify practices and processes they adopt to meet these expectations.

Despite this, there is general consensus that regulatory stewardship has not yet been collectively demonstrated or achieved. Why is this, and what is missing? To answer these questions it is useful to consider the approach taken by departments in preparing their regulatory stewardship strategies and reflect on how they recognise and integrate the regulator in meeting the described stewardship role in the updated expectations.

Current regulatory system oversight is generally led by policy agencies that are

structured as distinct departments. However, regulatory systems often exist across departments or agencies. A simple diagram (see Figure 2) illustrates how this arises.

There are two issues that this presents. The first is that system oversight requires a clear cross-agency approach, and the second is that it also requires direct involvement of regulators with functions in that regulatory system, irrespective of which agencies they are in. This is important because it is well known that regulatory outcomes depend almost entirely on regulators. The OECD has concluded: 'Regulators are playing an increasingly important role in delivering economic and societal objectives as well as being tasked with *regulating* more complex situations … As such regulators are key state actors with responsibilities and therefore are accountable for the delivery of policy outcomes' (OECD, 2014, p.15).

Where regulatory design, monitoring and review is treated as a policy exercise that seeks 'feedback' from regulators and regulated entities, it does not recognise the pivotal role played by regulators. There is often a cavernous divide between these parties. Policy analysts generally rely on theoretically objective and logical constructs to develop the policy solutions that underpin regulatory frameworks. The challenge is that these are intended to be deployed by practical technicians to influence or change the often subjectively driven behaviours of people. The dynamic and complex problems that are often faced on the 'front line' by regulators are not always susceptible to singularly clear and objective responses and may be significantly influenced by drivers and beliefs that policy analysts may simply dismiss or not appreciate.

Searancke and others have noted that 'Current thinking locates the regulator at the pivot of a complex system that requires many actors in many different roles to all play their part' (Searancke et al., 2014, p.55). It is exactly this system complexity which requires regulators to be intimately involved, not least because they are best placed to report on the system, and identify what is needed when changes are required.
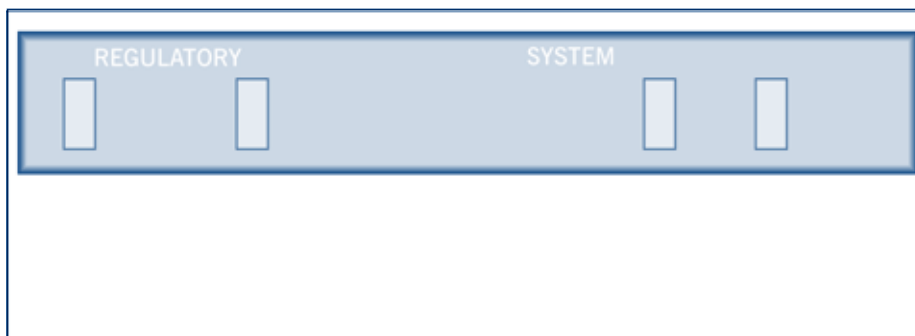
Steps to achieving regulatory stewardship

It could be argued that the fact that the updated expectations include a section on good regulator practice addresses the need to include regulators in the stewardship effort. However, this alone will not be enough. Even where regulatory functions exist within the same agency, the current approach to regulatory stewardship is often quite ineffective in ensuring that there is a true understanding and meeting of minds in the regulatory management cycle. This issue has been recognised by some agencies. The Department of Internal Affairs has made a conscious decision to adopt 'regulatory stewardship' as a practical approach to regulation (Department of Internal Affairs, 2017, p.12). This clearly seeks to leverage the value of regulators for stewardship purposes and illustrates that practical steps need to be taken to ensure that departments effectively engage the regulator (or regulators) within the system.

Specific steps that can be taken to improve the involvement of regulators should preferably be arranged around the four key themes that emerge from the updated expectations. They are:

· modelling leadership that promotes a whole-of-system view;
· engaging in genuine collaboration (between policy agencies, regulators and stakeholders);
· adopting good information management practices to support insight and improvement; and
· promoting regulator competence.

Leadership that promotes a whole-of-system view

The Productivity Commission concluded that improving the regulatory system needed clearer leadership and a more active centre (Productivity Commission, 2014, p.402). If one accepts that various agencies may have a role to play in any given regulatory system, it becomes even clearer that a focus on regulatory system stewardship depends on system leadership to achieve this. This starts at the top and requires senior state sector leaders to make commitments to achieving regulatory stewardship.

The State Sector Act supports this approach in two ways. The first is that under section 4A the state services commissioner has the responsibility to 'promote a culture of stewardship in the State services'. This provides an opportunity to establish clear state sector leadership for promoting a system view. The second is the express stewardship obligations on state sector chief executives for, among other things, 'the legislation administered by the department or departmental agency'. Interestingly, the obligations of chief executives are not collective and their stewardship focus is primarily on 'legislation', not regulatory systems. The obvious difficulty with this is that it is likely to be more narrowly focused than system leadership if each department meets this obligation by only focusing on the legislative regimes that they are expressly tasked to administer. In fact, existing regulatory stewardship strategies seem to evidence exactly that, which may be because the current departmental approach doesn't necessarily promote active involvement by the wider state sector in developing these strategies.

The 2017 regulatory strategy published by the Ministry of Business, Innovation and Employment (MBIE) notes that an all-of-system view is one of the three dimensions of regulatory stewardship and

'means understanding how all the parts of a regulatory system work together and are performing' (Ministry of Business, Innovation and Employment, 2017a, p.10). Despite this intention, a more detailed review of MBIE's strategy suggests that this is still a work in progress because the regulatory systems identified do not necessarily include all the regulatory agencies that have roles in their identified regulatory systems. For example, Figure 1 on page 10 of the strategy seeks to identify who carries out each regulatory function across MBIE's regulatory systems. For the financial markets and health and safety at work systems, key regulatory agencies such as the Reserve Bank of New Zealand,

importance of relationships between participants in a regulatory system (Ministry of Business, Innovation and Employment, 2017a, p.20). These charters set out very clearly what the objectives of the relevant regulatory system are and how all agencies within that system will work together to monitor its performance. It is crucial for effective regulatory stewardship that such frameworks are mandated and supported by senior leaders from all the agencies concerned, so that they can model the collaborative behaviours and culture needed to ensure that these charters are living documents.

Actions to provide system leadership as described above are relatively new. As

regulatory outcomes is almost always a co-operative effort: by the government, amongst regulators, the regulated, and the broader community' (OECD, 2014, p.15). This applies to policy agencies and regulators alike. The important issue is ensuring that engagement is done in a genuinely co-operative and effective manner.

While there is much evidence of regular collaboration and engagement between parties, it is not uncommon to hear concerns about levels of consultation or engagement in the regulatory management process. Regulators often express concern that their views on policy design and review are not being sought or heard, while many of the departmental stewardship strategies would suggest that policy departments have a different view. There appears to be engagement asymmetry that results in these different perceptions.

Work by Alberto Alemanno (professor of European Union law and regulation) helps to explain the cause of this phenomenon. He has concluded that 'public engagement has not yet become part of the policy process' (Alemanno, 2015, p.4). He identifies three types of engagement:

> Establishing a genuine collaborative participation model with regulators (and other stakeholders) at the core of the regulatory cycle is more likely to improve the policy design process and ultimately regulatory management.

Maritime New Zealand and the Civil Aviation Authority are not included. This omission will undoubtedly reduce the reliability of the system performance view. The result is that the strategies may not identify cross-cutting regulatory interests (or agencies) and therefore cannot fully identify 'the system' or its performance.

Collective leadership of all the stewardship obligations (at system level) is required to achieve a proper whole-of-system approach. Each agency can contribute to this by identifying the leadership commitment it will make to regulatory stewardship. The Department of Internal Affairs has implemented a strategy that is 'mandated and owned at a senior leadership level' and supported by the establishment of a role responsible for the regulatory stewardship work programme (Department of Internal Affairs, 2017, p.12). This illustrates a clear recognition by the department that strong agency leadership is a crucial step.

MBIE has implemented regulatory charters, which it considers recognise the

they evolve, the key improvement will be to ensure that they truly encompass a system perspective, because collective governance and leadership that promotes a system view is likely to be the single most transformative step that can be taken to achieve effective regulatory stewardship.

Done well, it will require genuine collaboration between policy and regulatory agency leaders and their people, as discussed below. It will also require individual agencies across the wider state sector to commit resources more effectively to support stewardship endeavours. It should also result in the benefits identified by the Productivity Commission, such as shared solutions and efficiencies (Productivity Commission, 2014, p.29).

Genuine collaboration

Once the leadership framework is agreed and established, there is a need to ensure that agencies collaborate effectively. The OECD has noted that 'Achieving good

(1) *Public communication:* policymakers convey information to the public. Due to the one-way information flow, the public is not involved. Public input is neither foreseen nor expected.

(2) *Public consultation*: Policymakers receive information from members of the public within the framework of a government-initiated process. The input gathered is perceived as representative of societal opinions on the subject.

(3) *Public participation:* members of the public and policymakers exchange information. As a result, unlike with the previous two forms of engagement, public participation involves some form of dialogue between policymakers and stakeholders. By involving some deliberation, public participation may lead to change in the opinions of both parties. (ibid., p.10)

While Alemanno's work focuses on engagement with the public, the concepts

that underpin the three types of engagement are relevant to the engagement between policymakers and regulators. All three types of engagement are important, but the partnership concept in the public participation option is likely to be the least common. Yet if deployed appropriately and genuinely it can be very effective.

Traditional views of policy advisors appear to favour input from regulators at the point of evaluation and review but not necessarily as an integral part of the policy design or regulatory strategy phase. The government regulatory management strategy expressly includes 'stakeholder feedback' as part of a functioning regulatory system. If that feedback is obtained in the same way as in the public participation engagement model, it is more likely to achieve a fully rounded system view. Front-line experience gives regulators a considerable advantage in understanding practical issues and likely behaviours or reactions to regulatory interventions. Regulators also know the limits of their own capacity and capability to execute regulatory initiatives. Policy agencies must gain a deep understanding of these issues to make durable policy decisions or inform redesign options. Establishing a genuine collaborative participation model with regulators (and other stakeholders) at the core of the regulatory cycle is more likely to improve the policy design process and ultimately regulatory management.

MBIE's 2017 regulatory stewardship strategy reveals that such mechanisms are being trialled (Ministry of Business, Innovation and Employment, 2017a, p.18), while Inland Revenue's regulatory stewardship strategy indicates that aspects of such an approach are already being applied through workshops and co-design options (Inland Revenue, 2017, p.6). Inland Revenue has described the benefits as follows: 'Having policy and service design officials working throughout the Generic Tax Policy Process creates a better outcome' (ibid., p.8).

Maritime New Zealand has gone a step further and used this model very successfully to review and redesign the New Zealand Port and Harbour Marine Safety Code (see companion article by Keith Manch in this issue of *Policy Quarterly*). This illustrates that genuine engagement can work at different levels of regulatory design and implementation and have remarkable results. Focusing on this is likely to generate the most significant opportunity for improvement in this area.

Information management for insight and improvement

For existing regulatory systems, stewardship is aimed at ensuring that the regulation remains fit for purpose. This requires effective monitoring, evaluation and review. The Productivity Commission noted that 'In-depth reviews of regulatory regimes have often followed a crisis, rather than being part of a systematic and strategic approach to review' (Productivity Commission, 2014, p.374). This is not specific to New Zealand. In an expert paper for the OECD, Cary Coglianese pointed out that governments around the world have 'paid remarkably little attention to analysing regulations after adoption or to evaluating the impacts of the procedures and practices that govern the regulatory process itself, so-called regulatory policy' (Coglianese, 2012).

The obvious consequence of failing to do regular evaluation and review is that there is no ability to gain a reliable insight into the effectiveness of the regulatory system. Monitoring and evaluation depends on reliable information and agreed frameworks for understanding and assessing system performance. A variety of actors play a crucial role in ensuring that information is available to undertake such a task. Policy agencies play a critical role in avoiding 'imprecise regulatory objectives' (Productivity Commission, 2014, p.380), while regulators contribute to this by collecting data and information as they implement regulations. While an agreed cycle of review needs to be built into work programmes to ensure that reviews actually take place, it is critical that regulatory agencies form a cohesive view of the kind of information that is needed to support this.

The regulatory stewardship strategies being published by various departments certainly demonstrate that progress is being made in this regard. However, many state that there is a lack of robust data and a limited evidence base, which challenges their ability to draw reliable insights on system performance. Regulators can play a significant role in changing this because they have the advantage of operational knowledge. One way of doing this is to establish effective intelligence models

> Effective regulator input into stewardship is not only dependent on the conduct of policy agencies; it is also conditional on sound regulator competence.

within regulatory agencies to ensure this occurs. While many have already started this process by setting up dedicated intelligence units, it may be useful to consider this as part of a whole-of-system view to avoid duplication of effort and inefficiency. This can be achieved through information sharing and joint efforts on information collection instead of relying on individual agency efforts. The Government Regulatory Practice Initiative (G-Reg) has taken steps to address this and recently hosted a workshop on effective collection, collation and analysing of information.

Regulator competence

Effective regulator input into stewardship is not only dependent on the conduct of policy agencies; it is also conditional on sound regulator competence. The updated expectations now include the expectation for regulators to 'contribute to wider regulator capability-building initiatives within the state sector where there are common interests and benefits from collective action and leadership'.

To address the issue of regulator competence, G-Reg was set up. The initiative includes the introduction of

Table 1: Summary of identified attributes of regulator culture

Attributes of a functional regulator culture
A culture embracing the organisation's role as an educator and facilitator of compliance
A culture that places a high value on robust, evidence-based regulatory decisions
A culture that values operational flexibility and adaption to changes in the regulatory environment
A culture that values continuous learning
A culture where internal debate is normal
A culture of transparency, openness and accountability
A culture that places great value on organisational independence and impartiality
A culture recognising the significance of civic responsibility that accompanies coercive powers of the state
Subcultures that align with the overarching objectives of the organisation

national qualifications for regulatory practitioners (from entry level to advanced practice), activities to share knowledge and good practice across agencies and sectors, and an arrangement with Victoria University for a chair in regulatory practice.

To ensure that regulator knowledge is effectively contributing to regulatory stewardship, it is crucial that regulators have the right capability to understand policy objectives and evaluate actions and behaviours of others in pursuit of the public interest outcomes being sought. This also requires competence to recognise patterns of behaviour that may point to more significant issues. John Braithwaite

Figure 3: Regulatory stewardship themes within the regulatory cycle
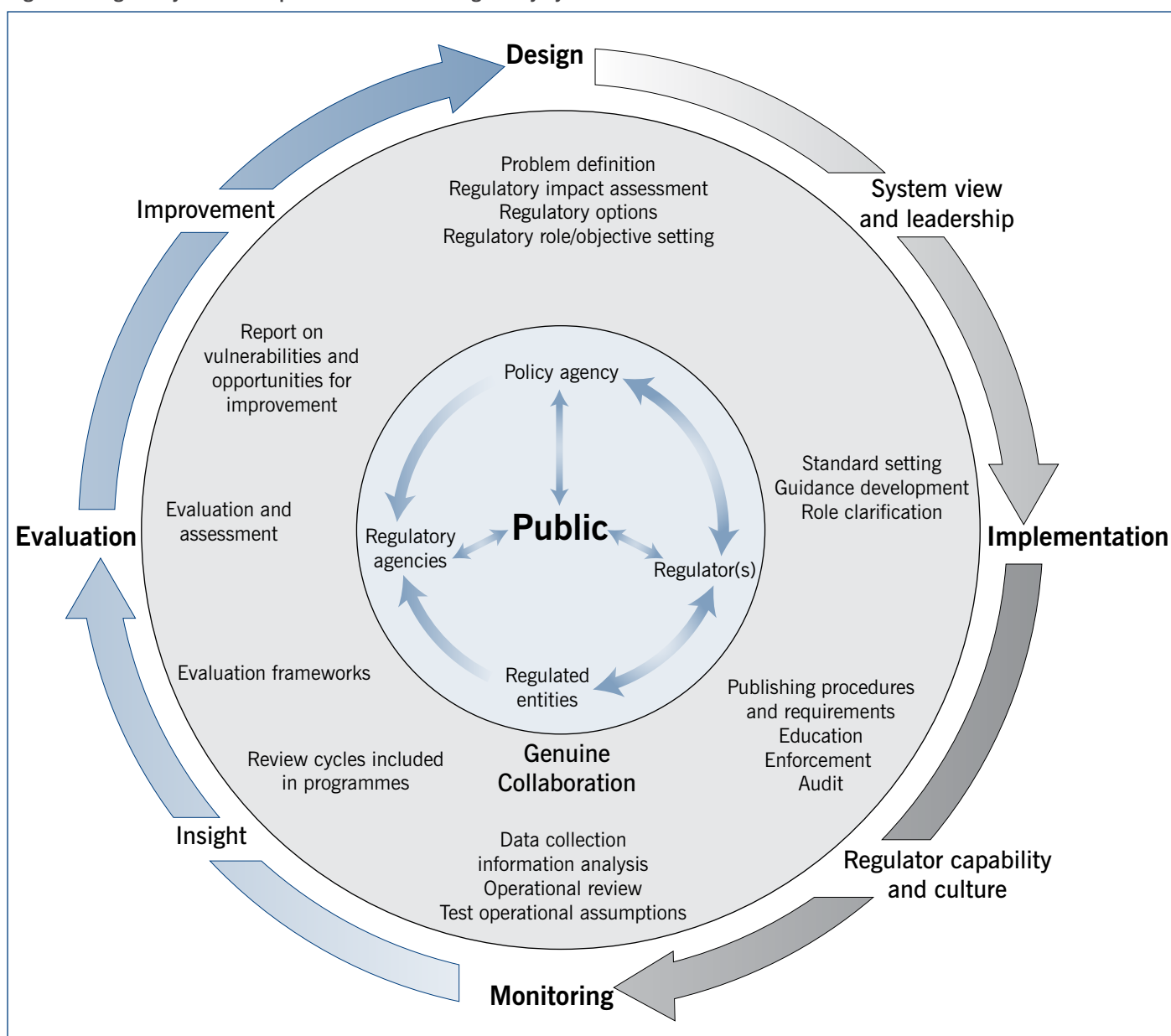
points to exactly such an example involving the American FBI not recognising the pattern of small frauds and loan arrangements which ultimately led to the 2008 global financial crisis (Braithwaite, 2016, p.25).

Historically, many regulators have recruited their employees from the sector they are charged to regulate. While such sector technical knowledge is critical, in the absence of regulatory skills they are compromised in their ability to engage with people and exercise the significant judgement required to make nuanced and complex regulatory choices. The director of the Penn Program on Regulation, Cary Coglianese, notes:

> Yet as vital as it is for a regulator to possess adequate technical skill and knowledge, such expertise is only one necessary component of regulatory excellence. By itself it is not sufficient. To move from good regulation to excellent regulation, the regulator also needs to master the people side of regulation. Regulation, at its core is relational. (Coglianese, 2017, p.12)

Another dimension of regulator competence is the need to create the right culture. The Productivity Commission describes this as a 'regulator culture' (Productivity Commission, 2014, p.86), which is summarised in Table 1. These cultural elements match the updated expectations for good regulator practice very closely. The G-Reg initiative will provide opportunities for improvement across all of these. As it strengthens regulator competence at individual and organisational level, regulators will be much better positioned to participate in system leadership, genuine collaboration and providing the greater insight that is required for successful regulatory stewardship.

Conclusion

The updated government expectations for good regulator practice are a marked improvement on earlier iterations because they recognise the role of the regulator. They also clearly articulate sound 'asset management concepts' which should improve regulatory stewardship. However, it is important that in seeking to meet these expectations, agencies focus on embedding them in a way that promotes a collaborative whole-of-system view.

To achieve this, it is suggested that efforts should be directed towards progressing the four themes mentioned above. The concrete steps that can be taken to do this are to establish a framework for the regulatory cycle in which the identified public interest objectives of the system are placed at the core, pulled together by genuine collaboration between all parties, including competent regulators, who are led from the top to promote a whole-of-system view in which good information practices allow for reliable insight and improvement over time. Figure 3 gives a diagrammatic representation of this framework.

In the meantime, a working group of the Government Regulatory Practice Initiative is developing best practice guidelines – from a regulatory practice perspective – in an effort to demonstrate how a strengthened contribution by regulators to regulatory policy can improve regulatory stewardship.

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Ben Wauchop and Keith Manch

ARE REGULATED PARTIES CUSTOMERS?

How does a regulator refer to the individuals or organisations it regulates? Are they customers, even though they are not buying a product or service, and often have little choice in the matter? Are they to be referred to as regulated entities, obligatees, licensees, taxpayers, businesses, employers or one of a number of other terms of this kind, their identity defined by their specific rights and obligations under the law? But what does this mean for regulatory agencies implementing multiple regimes?

Why does it matter?

This question matters because the current emphasis on improving how government engages with citizens in the broad sense,[1] and on improving the quality of regulation and regulatory practice specifically,[2] is as strong as it has ever been. If these parallel activities are to succeed, clear thinking is required.

Although questions about how to refer to regulated parties may appear trivial, they often provoke strong debate between otherwise agreeable regulatory practition-ers, and within organisations that have a mix of functions which include, but are not limited to, regulatory activity. At worst, regulatory staff in organisations with broader functions where a 'customer focus' mantra is embraced can feel disenfranchised and limited in their ability to do their jobs effectively. On closer inspection, this tension should perhaps not be surprising: different labels raise questions that go to the heart of some important questions of regulatory practice.[3] Who is the regulator working for? Who benefits from its work? Whose interests should it please?

It's an ongoing question

The debate around whether regulated entities and people (regulated parties) should be referred to as and/or treated like customers is a recurring one. The issue originally arose during the late 1990s and early 2000s as governments worldwide attempted to promote better delivery of government services through the guise of 'customer-focused government'. A paper from the British government is indicative of this time:

> To deliver lasting results, organisations need to embed customer focus throughout the system. Implementation must start by understanding the needs, expectations and behaviours of the public and then by *adjusting every aspect of the organisation to align with customer values.* (Barker, 2001, emphasis added)

Although largely a focus of government strategies rather than academic literature, the prominence of this approach provoked

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a number of responses from academics with a regulatory practice interest. Malcolm Sparrow, writing in 2000, argued that regulators needed to be wary about becoming customer focused, as the regulated entity is often 'not paying for the service, often does not want, and will not be pleased by it'. He was concerned that a customer orientation may lead to 'exclusion or neglect of enforcement capabilities' (Sparrow, 2000). It is also evident that referring to regulated parties as customers (bearing in mind the 'normal' meaning of the word and the often associated concepts such as 'the customer is always right')[4] will create certain expectations, specifically about whose interests are being served through regulatory activity.

Alford, in 2002, detailed a number of academics who had criticised the customer-centric approach, particularly because it devalued the idea of 'citizenship'. His contribution was to outline a number of reasons regulated entities were definitively not customers, including because they do not have choice and they do not consume the good or service the service is designed to deliver. Instead, he argued, regulated entities and government formed a more complex, three-way interaction, with the public as the third party (Alford, 2002).

Despite the passage of time, the debate about whether to refer to regulated parties as customers has not gone away. Within the Government Regulatory Practice Initiative – a network of New Zealand central and local government regulators – the issue about whether or not to use the term is raised regularly. A quick survey shows that varying approaches are in place. We can contrast two New Zealand regulators' approaches: Inland Revenue's *Multinational Enterprises: compliance focus* (Inland Revenue, 2016) mentions the word 'customer' six times; Maritime New Zealand's *Compliance Strategy* (Maritime New Zealand, n.d.) mentions the term not once.

More recent use of the term seems to have slightly different origins to the late 1990s/early 2000s high-level government strategies outlined above. Drivers include:
· the application and promotion of service delivery and service design

methodologies and techniques for a wide range of government services, methodologies and techniques which tend to refer to and utilise concepts of customer centricity;[5] and
· the use of 'customer frameworks', 'customer segmentation models' or 'personas' to inform the delivery of regulatory services.

These approaches present a number of opportunities for regulatory agencies. Used appropriately, they can help regulators move beyond simple models focused on the individuals and organisations they regulate and identify the root cause of complex regulatory problems.

required between a regulator and regulated party.

So what's the answer?
One way to address this is described by the United States Food and Drug Administration (FDA) in a 2004 white paper, 'Defining the customer in a regulatory agency' (FDA Quality Resource and Development Team, 2004). In that paper the FDA discusses relationships with the industry it regulates as involving a spectrum of customer interactions and notes that its customer relationship with industry will differ depending on the transaction involved. Essentially (as discussed in Appendix 2 of the paper), the

> Although contemporary service design has expanded its concept of a service in a way that can … account for more of the work of a regulator, it is still orientated around a 'customer' or 'user' ….

These methodologies and techniques have been largely adopted from areas outside regulation, however, and bring with them terminology and values that more easily relate to private sector service delivery, or public service delivery of non-regulatory services. Although contemporary service design has expanded its concept of a service in a way that can, with careful thought, account for more of the work of a regulator, it is still orientated around a 'customer' or 'user' of that service. This does not necessarily align with regulatory practice approaches which focus on improving compliance among regulated parties, where the value derived is in the form of regulatory outcomes that benefit the public.

If care is not taken, agencies can fall into a similar trap to the one Sparrow and Alford identified – applying broad strategic frameworks that promote certain regulatory practice techniques over others, in a way that is not really responsive, but predetermined by the 'label' chosen to define the relationship

proposition is that regulated parties are customers when receiving support and guidance from the FDA, but not customers when subject to enforcement action. Readers of this article who are familiar with the Tip Top ice cream advertisements from 2006 may be reminded of the 'togs, togs, undies, undies' television advertisement that asked how far you can go from the beach in your togs before you are regarded as wearing undies.[6]

Another approach would be to accept that regulated parties can never be considered customers in the ordinary sense of the word. Regulation is ultimately the exercise of the coercive power of the state. It is intended to get people to do things they might not otherwise do, or stop people doing things they would otherwise do. The customer is not always right if the customer is being regulated. Regulators can, however, and should, draw on customer frameworks or service design techniques to improve the way they deliver the outcomes they are charged with delivering. There is little doubt that

adopting innovative design thinking and continuous improvement approaches incorporating appropriate customer service principles will make regulatory practice more successful, as long as it is fit for purpose for the particular circumstances in which it is being used. The widespread engagement in and support for the Government Regulatory Practice Initiative is evidence that regulators have a deep interest in improvement.

This will require an acceptance that regulation and regulatory practice has a special character; it is not simply another line of government service delivery, for the reasons set out above. In turn this would require those leading and influencing the way government agencies undertake improvement activity to step back and consider how they can reframe their offerings to cater for regulators, alongside non-regulatory service delivery.

Take, for example, this extract from the Department of the Prime Minister and Cabinet's description of 'design thinking':

As a process, design thinking can help public service providers *get closer to customers, uncover their unmet needs,* and develop innovative products and services to meet those needs. It is particularly useful for addressing 'wicked' problems, for being more person-centric and for encouraging innovation. (Department of the Prime Minister and Cabinet, 2017, emphasis added)

How much more useful would it be for regulators if the framing was as follows:

As a process, design thinking can help regulators *get closer to the parties they regulate, uncover what they need to support, encourage and require them to comply, and develop innovative approaches to achieve this.* It is particularly useful for addressing 'wicked' problems, for being more person-centric and for encouraging innovation.

Of course, it's more complicated than this. But the point is, if it is accepted that regulation and regulatory practice is different from service delivery in the general sense, that the recipients of regulatory services are not 'customers' in the ordinary sense of the word, but the same kinds of techniques and thinking that are applied to improving customer services can be used, with appropriate modification, to improve regulatory activity, then the suite of design thinking and continuous improvement tools being used can be modified accordingly. This article might be thought of as an invitation to government's leaders in customer service improvement thinking to engage with leaders in regulatory practice to address the tensions and risks associated with referring to regulated parties as customers – by making those tensions and risks go away.

With this approach we can move past labels, and innovation can be brought to regulatory practice in a very considered way. The debate will move on. The purpose and nature of the relationship required between regulators and regulated parties will first be defined through careful assessment of the relationships required in what can be significantly different regulatory constructs,[7] without the influence of labels that might be loaded with meaning that is potentially unhelpful; then practices can be put in place to ensure that those relationships deliver on the outcomes desired. A common lexicon may not be entirely possible – or necessary – but a deeper understanding of the underlying issues may be.

1 Highlighted by the Design Thinking approach led by the Department of the Prime Minister and Cabinet and the Continuous Improvement 'better every day' approach led by the State Services Commission. This process is described at https://www.dpmc.govt.nz/our-programmes/policy-project/ policy-methods-toolbox/design-thinking/journey-mapping.
2 Highlighted by the 2013 commissioning of the New Zealand Productivity Commission to inquire into regulatory institutions and practices and the comprehensive government response to its subsequent report.
3 In this article 'regulatory practice' relates to the range of activities that are undertaken to support, encourage and require compliance with regulatory obligations, from information and education to administrative sanction and prosecutions.
4 The phrase 'The customer is always right' was originally coined in 1909 by Harry Gordon Selfridge, the founder of Selfridge's department store in London, and is typically used by businesses to convince customers that they will get good service at this company and convince employees to give customers good service (http://www. huffingtonpost.com/alexander-kjerulf/top-5-reasons-customer-service_b_5145636.html).
5 For example, the Design Thinking approach led by the Department of the Prime Minister and Cabinet and the Continuous Improvement 'better every day' approach led by the State Services Commission.
6 Accessed 17 September 2017 https://www.youtube.com/ watch?v=h-Lx2ihpGbc.
7 There is a wide range of different types of regulation, including prescriptive and performance-based; and positive and negative regulation, in the sense that in some areas a licence is required to operate, while in others no licence is required but you can be sanctioned if you do not do what is required. In some areas regulation is focused on individuals and business; in others just on individuals. Each requires different systems, processes, skills and engagement methods on the part of the regulator.

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Keith Manch

New Zealand's Port and Harbour Marine Safety Code
A CASE STUDY IN CO-REGULATION

The inaugural annual national forum on the 2016 New Zealand Port and Harbour Marine Safety Code took place in July 2017 in Wellington. The 2016 code replaced a code originally put in place in 2004. Participants in the forum included the 2016 code partners: port companies, regional councils/unitary authorities, Maritime New Zealand, as well as maritime industry representatives, and other government agencies with an interest in maritime safety. The forum represented an important waypoint in the journey from the development, implementation and review of the 2004 code, to the development and implementation of the 2016 code as a key part of the regulatory system that seeks to manage port and harbour risks.

The 2004 code was put in place following a series of shipping incidents in 2002–03, including a serious incident in the Gisborne port involving the *Jody F*

Millennium. That ship grounded and the subsequent investigation highlighted the need for improved regulatory arrangements to manage risks in New

Zealand's ports and harbours (Ministry of Transport, 2007, p.7). While the 2004 code was well intentioned and created some improvement in the safety management culture in New Zealand's ports and harbours, over time concerns emerged about its relevance, effectiveness and efficiency as a way of managing successfully the risks it was intended to deal with.

These concerns were addressed by establishing the 2016 code as part of a co-regulatory mechanism which is defined by a memorandum of understanding (MoU) (Maritime New Zealand, 2017a) signed by representatives of port companies, councils and Maritime New Zealand. While not legally binding, the MoU commits the parties to principles of tripartite joint ownership of the 2016 code, voluntary adoption of mutually agreed standards, collaboration, commitment of human resources to support delivery of an agreed work plan, information sharing, and joint funding of a secretariat. The 2016 code establishes clear responsibilities and accountabilities

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Box 1: History and role of pilots and pilotage

In its article 'History of maritime pilots', the French maritime pilots' federation notes that pilots have a long maritime history, starting around the time the exchange of goods began in the Mediterranean basin, and reference to the term pilot (as a guide of the ship) appeared in Ezekiel's book in the 6th century BC[2] (Fédération Française des Pilotes Maritimes, 2017). The article notes that the ancestor of the maritime pilot can also be found in the travel literature, in a book called *Periplus of Erythraean Sea*, written in the 1st century AD. Fast forward to the 17th century and it is noted that 'In Europe, since the beginning of the 17th century, the pilotage is regulated in all the countries by national laws, called "Pilotage Acts", and by local regulations of ports, fixing the professional status of the pilots in each country.'

In New Zealand, in 1842 a Harbour Regulations Ordinance was issued, divided into four parts: pilots and pilotage; quarantine; harbour regulations; and penalties. The modern version of this ordinance is the Maritime Rules, part 90: pilotage, the objective of which is to maintain the contribution of pilotage to the safety of navigation, the protection of the marine environment and the efficiency of seaborne commerce, set minimum national standards while enabling port-specific risks to be addressed, provide a licensing regime for pilots and pilotage-exempt masters within the maritime document provisions of the Maritime Transport Act 1994, recognise and support industry best practice, and ensure the provision of pilotage services.

which operate in addition to the core regulatory framework that underpins safety in the port and harbour environment. The MoU is clear that there is no constraint on the ability of councils or Maritime New Zealand carrying out their regulatory functions.

This article is a case study of the journey that led to the forum. It introduces co-regulation as a regulatory mechanism, canvasses why ports and harbours need to be regulated and identifies the key players in the regulatory system. It describes the journey to the development of a co-regulatory approach in which there is active acceptance of shared accountability for delivering agreed outcomes. It concludes with reference to the key design features of the co-regulatory mechanism and views of its effectiveness in the context of good regulatory practice.

In addition to being a case study of the journey to co-regulation, it is a story of central and local government agencies working together effectively to address risks of national significance.

Co-regulation

Referring to co-regulation as a mechanism is consistent with its position as part of a taxonomy of the available forms of regulation as discussed by Freiberg (2010); and it reflects the generally understood description of co-regulation as involving industry and government (the regulator) collaborating to develop and administer arrangements that address an area of risk, with those arrangements accompanied by a 'legislative backstop', as discussed by Compliance Experts (n.d.) and the Ministry of Consumer Affairs (1997). Co-regulation sits on a spectrum of regulatory mechanisms which goes from full government regulation, through co-regulation, to self-regulation, with each involving more or less government intervention, as set out by Allen+Clarke (2012). In essence co-regulation has features of both government regulation and self-regulation.

Within each mechanism there is also a spectrum of 'levels' of government intervention. For example, the gas industry in New Zealand is regulated

through a co-regulatory mechanism. That mechanism is established through legislation. The body responsible for its implementation (the Gas Industry Company Limited) is a formally constituted 'industry body' under the terms of the Gas Act 1992. However, the port and harbour safety co-regulatory mechanism is an entirely voluntary arrangement which involves government (both central and local) and industry establishing an MoU, developing a code, and putting in place an implementation body and process. This mechanism operates in addition to core legal requirements relating to safety and environmental protection in the port and harbour environment. Effectively, the code adds value by providing guidance and support to parties with accountabilities and responsibilities under the law.

Why ports and harbours need to be regulated

In her keynote speech to the inaugural national forum, Belinda Vernon, deputy chair of the Maritime New Zealand Authority,[1] said:

New Zealand's economy relies on the safe operation of our ports and harbours. With more than 99% of exports and imports by volume moving through our ports, safety of shipping in New Zealand ports and harbours is essential. It is important not only economically but also in terms of potential risk to life, property and environment from a serious shipping accident.

Weather events, larger vessels, more cruise ships, changing technology and conflicts between commercial and recreational use, all contribute to the changing marine operating environment, creating challenges and opportunities. Managing the risks associated with these is paramount. (Vernon, 2017)

While this was a statement related to the 2016 code, it describes well the nature of activity and risks associated with ports and harbours. This does not in itself mean that regulation is required to manage those risks.

In plain terms, the rationale for regulation is that the risks won't be managed effectively if users are left to their own devices. The regulatory impact statement supporting changes to port and harbour safety regulation in 2013 (Ministry of Transport 2008) referred to the series of incidents that occurred in 2002-03. Those incidents revealed a pattern of failures in port safety governance and operational procedures (not only confined to ports where incidents had occurred) that supported the need for regulation.

Key players in the port and harbour regulatory system

Port companies, councils and Maritime New Zealand are all involved directly and/or indirectly in the regulatory system that applies to ports and harbours. Two of the primary means of addressing risks in the port and harbour environment are through the functions of pilots and harbourmasters, who are employed by port companies and councils respectively. Maritime New Zealand has regulatory oversight of safety and environmental matters, and pilotage and harbourmaster functions, through the Maritime Transport Act 1994.

Port companies came into being as a result of the Port Companies Act 1988, the purpose of which is to promote and improve efficiency, economy and performance in the management and operation of the commercial aspects of ports. This gives a clue to their primary focus being to operate commercially, not to operate as regulators. Port companies are generally owned (in full or in part) by councils, but operate at arm's length. Port companies employ, or contract, pilots to assist in guiding ships into harbours. Pilots are service providers, not regulators. Box 1 sets out briefly the history and role of pilots.

Councils' responsibilities are set out in the Maritime Transport Act 1994 (following amendment in 2013) and include harbour navigation and safety, oil spills and other issues related to marine pollution. They are effectively the 'local' regulators in the port and harbour environment, with the ability to set by-laws to manage a prescribed set of local

Box 2: History and role of harbourmasters

According to Captain Rinze K. Mast, writing in *Port Technology International* (n.d.):

> The office of harbour master can be traced back to 317 BC at least. It was in that year that a Cyprian businessman, with the name of Zeno of Citium (c.336-c.264 BC), encountered a storm off the port of Athens, Greece. As at that time Zeno could not avail himself of the services of an Athenian Harbour Coordination Centre he was shipwrecked near the port entrance and was rescued by a bookseller, who also held the post of harbour master and bath-superintendent. … In more recent years the harbour master's office can be traced back to The Netherlands, Middelburg 1513 and Rotterdam 1554, the United Kingdom, Bristol 1669, and Belgian Ports about 1800. (Mast, n.d.)[3]

Closer to home, Maritime New Zealand's history timeline on its website records that in 1841 Auckland's first harbourmaster was appointed.

While the legislative underpinnings for harbourmaster functions referred to above are not clear, today in New Zealand the role of the harbourmaster is defined by reference to the functions and powers set out in the Maritime Transport Act 1994, sections 33E and 33F (as amended in 2013). In summary, a harbourmaster's purpose is to ensure maritime safety in relation to ports, harbours or waters for which he or she has been appointed as a harbourmaster by a regional council. The harbourmaster has a variety of powers to achieve this, including giving directions regarding navigation practices and ships' masters' actions in respect to ship movements, and regulating and controlling traffic and navigation in certain circumstances.

navigation safety issues. Their responsibilities in this area are typically met through employing harbourmasters (or contracting the provision of harbourmaster services). While harbourmasters provide services, they are regulators. Box 2 sets out briefly the history and role of harbourmasters.

In some cases harbourmaster services are provided by port company employees. For example, in Nelson the harbourmaster is also the marine operations manager for Port Nelson, and a pilot in that port and region. In Taranaki a similar situation exists, with the harbourmaster function being undertaken by the port marine operations manager. As these combined functions may be perceived as involving conflicts of interest, arrangements are in place involving deputy harbourmasters to ensure that functionally independent decision making occurs where necessary.

Maritime New Zealand's responsibilities include taking action in situations where port management poses

a significant risk to the safety of shipping and, potentially, to the marine environment. This is done through legally enforceable interventions, should such action prove necessary. Maritime New Zealand also employs the harbourmaster for the port at Taharoa, which is an offshore terminal used for loading ironsands onto purpose-built vessels.

The regulatory system in respect to ports and harbours is somewhat complex. Given the integrated nature of the roles, responsibilities and accountabilities, it is apparent that clarity between parties, supported by good communication and cooperation, is necessary for the system to work effectively. This provides fertile ground for a well-designed co-regulatory mechanism.

The journey to a co-regulatory approach

The journey towards today's co-regulatory approach began with the Transport Accident Investigation Commission and the Maritime Safety Authority (as of 2005

Maritime New Zealand) investigations of the *Jody F Millennium* and other incidents in 2002–03. Those investigations identified a pattern of problems, and noted that the current arrangements did not deliver sufficient rigour and consistency in port and harbour safety management. The statutory powers (the 'legislative backstop') available to deal with these systemic problems were not considered to be of much use in doing so (Ministry of Transport, 2007, p.7).

The Maritime Safety Authority

The Code and Guidelines have been a big step forward for improvements to the safety of maritime operations for ports and harbours.

The new Code specifies the responsibilities of all participants in the port and harbour system including regional councils, territorial authorities, port companies, and the MSA.

The Guidelines provide a clear steer on best practice for implementing measures for risk

It might be thought that this 2004 approach was essentially a co-regulatory mechanism (i.e. involving industry and government (the regulator) collaborating to develop and administer arrangements that address an area of risk). However, the comment 'Although the code is voluntary' followed by the list of steps required, and the positioning of the Maritime Safety Authority as signing off on risk assessments, periodically auditing harbour safety management plans and developing guidelines, challenges whether this was the case. In effect a regulatory mechanism had been put in place that was intended to operate through cooperation and be voluntary, but the authority's position as the 'owner' of the code (Ministry of Transport, 2007, p.8) and the responsibilities it held were essentially the same as those that applied in its statutory regulatory function. This meant that its true character was not one of co-regulation. In retrospect it might be thought of as imposed self-regulation, which is neither government regulation, co-regulation nor self-regulation as those mechanisms are generally understood.

> In retrospect it might be thought of as imposed self-regulation, which is neither government regulation, co-regulation nor self-regulation as those mechanisms are generally understood.

recommended the development of a national port safety code, modeled on the United Kingdom Port and Marine Safety Code, or the making of maritime rules to the same effect. However, the Maritime Transport Act 1994 did not provide any statutory authority for a mandatory code of the type proposed, so it would only be possible to establish such a code as an administrative measure, with voluntary compliance (ibid.). Thus, in consultation with industry, local government and relevant central government organisations, the 2004 code was developed. It was accompanied by guidelines covering matters such as port and harbour risk assessments and safety management systems, hydrographic surveys, aids to navigation, power line waterway crossings, environmental factors and aquaculture areas and marine farms. There was no body with any formal underpinnings (either legislative or voluntary) established to oversee its implementation, and much of the responsibility sat with the Maritime Safety Authority.

Harry Duynhoven, minister of transport at the time, in a speech to the National Ports Forum on 23 November 2004 made the following comments:

assessment, hydrographic surveys, aids to navigation, and environmental factors affecting safe access and operations in ports and harbours.

In terms of timings, implementation of the Code has already begun. Although the code is voluntary:
- Regional councils are being asked to complete harbour risk assessments by June 2005 which will include an assessment of port-related marine operations in their region.
- Once MSA has signed off on these risk assessments, councils are will move toward developing safety management plans by June 2006 which will be reviewed and approved by MSA.

MSA will then periodically audit harbour safety management systems to ensure compliance.

Over the next two years, MSA has programmed further work on Code-related guidelines and competency standards, covering vessel traffic services and harbourmasters. (Duynhoven, 2004)

Another key aspect of the minister's speech was its announcing that:

A law review, programmed for the coming year, will consider what new or amended legislation is required to support the implementation and ongoing development of the safety system. A review of maritime rules dealing with pilotage will follow the completion of regional risk assessments and safety management systems.

Ultimately, the review Duynhoven referred to didn't commence until 2007. However, this statement tended to support the possibility that the code could be made mandatory at some point.

Indeed, Maritime New Zealand expressed the view in response to the Ministry of Transport's 2007 *Port and Harbour and Navigation Safety Management* discussion document (Ministry of Transport, 2007) that a lack of legislative backing for the code left the system with an inherent weakness. However, changes to the Maritime

Transport Act 1994 that did occur finally in 2013 did not provide specifically for a mandatory code. Those changes did improve the 'legislative backstop' by introducing what the minister for building and construction, Maurice Williamson, on behalf of the minister of transport referred to in Parliament as:

> measures that specify the maritime safety responsibilities of port operators and the related powers of the Director of Maritime New Zealand to intervene in the interests of maritime safety. These measures will support and complement the voluntary New Zealand Port and Harbour Marine Safety Code 2004. (Williamson, 2013)

Maritime New Zealand's environmental scan – the platform for a true co-regulatory approach

As these legislative changes were emerging, progress with the implementation of the 2004 code was increasingly a topic of discussion in the maritime community. There were concerns about the level of attention being paid to it. In particular, discussion of concerns at a 2013 meeting of the Harbourmasters' Special Interest Group[4] triggered Maritime New Zealand to step back and consider the future of the 2004 code.

An example of the basis for the concerns was that, as of late 2013, despite the original intentions associated with the introduction of the 2004 code, while Maritime New Zealand had approved safety management systems in eight ports and harbours, nine ports and harbours were still without safety management system approval. The majority of the nine had submitted documents to Maritime New Zealand, but there was uncertainty about the status of the safety management system documents in some cases (i.e. whether they were at a standard that could be approved). The reality of this was that Maritime New Zealand had not prioritised resources to fulfil the role it had under the code. Maritime New Zealand has a broad remit and other priorities constantly emerged. With the 2004 code work not being part of its formal regulatory role, that work did not

Table 1: Key findings of the environmental scan

Dimension	Key findings in relation to the code
Relevance	The code remained relevant but needed refreshing to renew sector commitment to the process and position of the code, and to strengthen nationally consistent safety management practices. Use of the word 'approval' in respect to Maritime New Zealand's role in confirming that a safety management system met code requirements appeared to confuse accountability for safety outcomes.
Effectiveness	The code was an effective catalyst for establishing a culture of safety management, and in some regions the level of enthusiasm for collaboratively developing a safety culture was obvious. There were strong indicators, but insufficient evidence, to conclude that the code had delivered a consistent standard of port and harbour safety management across New Zealand. Maritime New Zealand's inability to resource its code implementation role had compromised effectiveness.
Efficiency	The leadership qualities and maritime knowledge of harbourmasters had a bearing on how efficiently code implementation occurred at the regional level. Maritime New Zealand's inability to resource its code implementation role had compromised efficiency.
Equity	Councils vary in size and rating base and some found the financial and human resource requirements to meet their obligations were quite onerous.
Status	The weight of opinion was strongest towards maintaining a voluntary code. Some smaller councils thought making it mandatory would ensure that it was prioritised at the local level.

have a funding stream to support it. Given that it was anticipated that a proper review and approval process took about 8–10 days of one person's time, this was not an insignificant matter (Ministry of Transport, 2007, p.21). This situation was far from satisfactory in terms of having appropriate levels of documentation and assurance of safety management systems, as was intended by the 2004 code.

However, the view was widely held that the advent of the 2004 code had brought about a culture of systems-based risk assessment and safety management in New Zealand's ports and harbours, and there were good examples of this.[5] For example, whether or not all safety management systems had been reviewed and approved by Maritime New Zealand, as compared to the situation in 2004, safety management systems did exist in all of New Zealand's ports and harbours; and some regional councils and ports had strong and functional port and harbour safety meetings that drove collaborative decision making around safety matters.

Following internal consideration of the future of the code, Maritime New Zealand, through a joint Maritime New

Zealand/regional council steering group that operates to address matters of common interest, commenced an environmental scan[6] to determine how relevant, effective, efficient and equitable the code remained. The environmental scan also addressed whether the port and harbour community considered the code should remain voluntary.[7] A representative of the Port Company Chief Executive Group[8] was also invited to take part in overseeing this scan. Ultimately, the collective leadership shown by this oversight group was an important contributor to the success of the review of the 2004 code and development of the co-regulatory mechanism and 2016 code, and this continues to be the case.

The scan confirmed that, as discussed above, while the development and implementation of the 2004 code might on the face of it appear to be an example of co-regulation, in comparison with the 2016 approach that would emerge this was not really the case.

Findings of the environmental scan

The findings of the scan were reported in February 2014 (Maritime New Zealand,

2014) according to the key dimensions of: relevance; effectiveness; efficiency; equity; and status. These findings identified key matters that would need to be addressed to make a refreshed approach successful. They also provided a platform for establishing a truly co-regulatory mechanism. The key findings are summarised in Table 1.

Consideration of the findings led to a set of recommendations that were accepted by the joint oversight group and informed the development of the co-regulatory mechanism that is now in place (including the 2016 code). The recommendations, elaborated in Table 2, were:

1. *Address outstanding safety management system (SMS) 'approvals',* to demonstrate that a high level of safety management existed nationally.
2. *Revive and strengthen joint commitment of the port and harbour marine safety code,* with the clear desire for it to be voluntary and provide a national safety standard.
3. *Update the code and supporting guidelines,* to reflect changes to the law, and provide for a style that was less prescriptive than the original code and able to accommodate a broader concept of best practice risk assessment and safety management practice.
4. *Improve the code's operational efficiency,* to minimise the compliance burden while maintaining the integrity of the 'approval and audit' system.
5. *Collect and communicate evidence of the code's effectiveness,* to provide for statistical trend analysis of port and harbour accidents and incidents, provide data to champion the effective implementation of the code, and support an annual meeting that would provide for sharing of information, learning lessons and continually improving.

Key design features of the co-regulatory mechanism

Action on recommendation 1 set the scene for key design features for the co-regulatory mechanism that now exists. As indicated in the introduction, the key design features are: a tripartite memorandum of understanding; joint ownership of the 2016 code, with clear objectives; voluntarily adopted and mutually agreed standards; commitment of human resources to support delivery of an agreed work plan; information sharing; and joint funding of a secretariat.

Effectiveness of this approach

The annual report of the New Zealand Port and Harbour Marine Safety Code (Maritime New Zealand, 2017b) included the following statement from the code steering group:

> The Code stakeholders can be assured of the effectiveness of the voluntary approach to the 2016 Code. In order to test the level of satisfaction with Code progress and performance, we consulted with the partner organisations during the year. They reported a high level of satisfaction with the rate of Code implementation and Work Plan delivery.
>
> We are confident that the 2016 Code is moving us all in the right direction. The rate of progress this year is very encouraging.
>
> Collectively we believe a voluntary Code applied through a systems approach will enable us to demonstrate that together in partnership we are stepping up to our obligations and responsibilities as guardians and managers of our marine environment. The 2016 Code is our pathway.

This is a significant shift from the concerns being expressed in 2013. It reflects a process of careful review of the previous regime and consideration of the design and implementation of the co-regulatory mechanism that now exists. While this occurred prior to the release of *Government Expectations of Good Regulatory Practice* in April 2017, the approach taken reflects key expectations expressed in that document.

The expectations indicate that regulatory systems should be assets, not liabilities: i.e. they must deliver benefits that exceed their costs. They also emphasise the need to remove or redesign a regulatory system or component that isn't delivering net benefits. While no quantitative cost-benefit assessment was undertaken in respect to the 2004 code, concerns raised led to the environmental scan. That scan highlighted problems and weaknesses which meant that the express intention, set out in the 2004 code, of 'securing the future safety of marine operations in New Zealand ports and harbours' was apparently not being met (Maritime Safety Authority, 2004).

The expectations describe the features of a regulatory system that is more likely to deliver durable outcomes. Those features include: clear objectives; flexibility of approach to accommodate the attitudes and needs of different regulated parties; proportionality, fairness and equity in the treatment of regulated parties; obligations set out clearly; and scope to evolve. These are all features of the design and implementation of the co-regulatory mechanism that now exists; and, importantly, they are features that have arisen from a co-design process involving government regulator (central and local government working together) and regulated party engagement.

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1 The Maritime New Zealand Authority is the board of Maritime New Zealand, the Crown entity tasked with undertaking safety, security, marine protection and other functions in a way which contributes to the aim of achieving an integrated, safe, responsive and sustainable transport system.
2 This is a reference to Ezekiel, chapter 27 in the Bible.
3 This article was kindly provided by Anne Carnegie, secretary, International Harbour Masters' Association, PO Box 3111, Lancing, BN15 5BQ, United Kingdom.
4 A forum that existed within the network of regional councils at the time to bring together harbourmasters and engage with other key players such as marine managers, pilots and Maritime New Zealand; it has more recently been replaced by the Navigational Safety Special Interest Group, which has a similar purpose.
5 Indeed, it is this situation that had effectively provided some comfort to Maritime New Zealand that it could focus on other priorities.
6 The term 'environmental scan' is used to refer to a quick assessment of what is working and not working for those engaged in a programme; environment in this context means the broader setting.
7 This was probably a moot point as it was clear that the amendments to the Maritime Transport Act were not directly contemplated as making the code mandatory, although they did include a provision that enables the director of Maritime New Zealand to impose conditions on port operators should evidence support the need for that.
8 The Port Company Chief Executive Group coordinates common interests of the port companies in relation to government.

Table 2: Key design features flowing from consideration of recommendations

Recommendation	Design features
Address outstanding SMS 'approvals'	The first step taken was to address outstanding SMS 'approvals'. An early decision was to acknowledge that referring to 'approvals' did not fit comfortably with a voluntary, collaborative approach. This action was reframed as providing 'confirmation' to port company and council chief executives that the SMS met the requirements of the code (at that point, the 2004 version). In support of the intent of recommendation 1, as a trial a joint port, council and Maritime New Zealand working group was established. This working group established panels of experts to 'confirm' the SMSs that had not previously been 'approved'. The experts were drawn from each of the partner groups (ports, councils and Maritime New Zealand).
Revive and strengthen joint commitment of the Port and Harbour Marine Safety Code	In August 2016, reflecting the success of the trial approach to addressing outstanding SMS 'confirmations', an MoU was signed by representatives of port company chief executives and regional council chief executives (that were listed individually in the MoU) and the chief executive/director of Maritime New Zealand (Maritime New Zealand, 2017a). While not legally binding, this commits the parties to principles of tripartite joint ownership of the code, voluntary adoption of mutually agreed standards, collaboration, commitment of human resources to support delivery of an agreed work plan, and joint funding of a secretariat. Critically, the MoU is clear that there is no constraint on the ability of councils or Maritime New Zealand to carry out their regulatory functions.
Update the code and supporting guidelines	Parallel with the trial, and the development and signing of the MoU, the 2004 code was refreshed and the 2016 version released. The 2016 code provides clarity in respect to its objective ('to ensure the safe management of ships navigating in New Zealand ports and harbours, including the prevention of: injury to people or loss of life, and damage to the environment, particularly to the marine environment, but also to property'). It also establishes clearly who the 2016 code applies to, what it covers, where it should be applied, the respective responsibilities and accountabilities of the parties to the code, and its relationship to legislative requirements. Consistent with the MoU, the 2016 code established a tripartite steering group, working group and a jointly funded secretariat. It established processes for joint peer review panels and confirmed that code activities did not prevent councils and Maritime New Zealand from independent exercise of their regulatory functions. The secretariat and working group have the task of developing a work plan for consideration by the steering group, including a schedule of SMS reviews, and review and development of supporting guidelines. Resources for these activities are provided by the partner groups.
Improve the code's operational efficiency	The key barrier to efficiency had been the difficulty Maritime New Zealand had in assigning resources to undertake 2004 code-related activities. It was also noted that the leadership qualities and maritime knowledge of harbourmasters had some bearing on how efficiently tasks could be carried out. The MoU and the 2016 code establish clear commitment to resources and sharing of the work load across all parties to ensure efficient execution of code tasks. Involvement of panels of experts supports the development of leadership and knowledge sharing among all code participants. The 2016 code also addresses potential conflicts of interest. Noting that in some cases harbourmasters are employees of port companies in addition to having harbourmaster responsibilities, the code provides guidance to ensure the independence of the exercise of harbourmaster functions. Conflicts of interest may also occur should a review panel member (for example, from Port 'A') have access to information that is commercially sensitive when reviewing the SMS of another port (Port 'B'), particularly where ports A and B are in direct competition. This matter is addressed in the assignment of panel members, including a requirement to protect and respect commercial confidentiality.
Collect and communicate evidence of the code's effectiveness	The code establishes: • a requirement for review panels to report their findings to the working group; • a requirement for annual self-assessments by ports and councils, which are to be provided to the working group; • the need for the development of performance standards to measure the effectiveness of the code. The information provided from these processes is used to prepare an annual report on the effectiveness of the code. The MoU also provides for national meetings of 2016 code participants and stakeholders to assess national performance of the code. The inaugural national forum took place in July 2017 in Wellington. The first annual report was released in September 2017.

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Chris Ballantyne

A Rail Tale

In 2005, Parliament passed new legislation to regulate railway safety in New Zealand. Applying international best practice, the Railways Act took a goal-based approach that utilised the Safety Case concept as the foundation for regulatory oversight. This article describes the Transport Agency's experience in implementing this regulatory approach, particularly the Safety Case concept. The change required the Transport Agency to first recognise that fully harnessing the legislation required a transformational response and then, along with the wider industry, address the challenges faced in developing and implementing an appropriate regulatory operating model

Railway safety is just one of many areas in New Zealand where a goal-based approach has been adopted. Goal-based safety regulation offers the potential to provide organisations with more flexibility in meeting their obligations. It contrasts with prescriptive-based regulation, where government seeks to manage risks on industry's behalf, not necessarily more reliably, by voluminous and continually growing instruction on safety requirements (Robens, 1972).

Regulators are fast building the skillsets required in response to this change in regulatory practice, supported by cross-government capability building initiatives such as G-Reg. However, as the Transport Agency has found, the change is not just about new skills. It is about transformational change to enable organisations and staff to make best use of their new regulatory tools and skillset.

As a result, the Transport Agency is changing the way it interacts with the organisations it regulates, and how it measures the success of regulatory interventions. Its experiences are not unique among the regulatory community (New Zealand Productivity Commission, 2014).

The Railway Story
Railways in New Zealand recently celebrated its 150th year – the first public railway joined Christchurch to Ferrymead in 1863, just 23 years after the signing of the Treaty of Waitangi. The railway industry has been through peaks and troughs – both in its role as a driving force behind the growth of our nation and in its success in keeping its workers and passengers safe.

1863 – 1983: The emergence of a nationalised rail network
17 years after the Provincial Government created the 7km Christchurch-Ferrymead link, the network had grown to 1,900km and New Zealand Railways, the national rail provider, was created. By 1920 railways ran the length of the country and carried 28 million passengers per year - in a country with a population of only a million.

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Table 1: Disasters in New Zealand's early rail history

Year	Location	Fatalities	Event
1923	Ongarue	17	Auckland to Wellington passenger service hit landslide and derailed
1936	Ratana	7	Wellington to New Plymouth passenger service overturned due to excessive speed on a corner
1943	Hyde	21	Cromwell to Dunedin passenger service overturned due to excessive speed on a corner
1948	Seddon	6	Picton to Christchurch passenger service overturned due to excessive speed on a corner
1953	Tangiwai	151	Wellington to Auckland passenger service fell into the Whangaehu River after a lahar sweeps away the bridge

As the network continued to grow, the safety systems required to manage it grew as well. Rail is an activity exposed to low frequency, high consequence accidents – movement of large objects at speed has always meant a complex system of controls are required to prevent fatalities. Vulnerabilities have been learnt the hard way in some cases (see Table 1).

The national rail provider took a strong, but prescriptive approach to safety – as all industries of the day did. It created a quality management system based on an ever expanding mountain of rules, policies and schematics to dictate safety.

By the 1950s, rail was starting to decline in popularity as a series of shocks hit the industry. The widespread uptake of motor cars cut passenger numbers, and deregulation in the 1970s and 1980s saw a considerable move of freight tonnage to road. New Zealand Rail had been a government department for most of its existence but, struggling to cope with these shocks, was turned into a State Owned Enterprise in 1982 in an attempt to turn the industry around.

1983 – 2005: A struggling system
Government efforts to cut costs and restructure to address rail's profitability ultimately culminated in the sale of the national rail provider to a private consortium in 1993. Staff numbers, peaking at 21,000 in 1982, had dropped to below 5,000 by this stage.

The following decade was one of the hardest in New Zealand rail's history as ownership and investment drifted. The business was renamed Tranz Rail and subject to aggressive profit strategies.

Former Treasury official John Wilson (Wilson, 2010) wrote that, by 2001:

> Tranz Rail's financial problems were now creating visible shortfalls in the capital asset replacement programme

The prescriptive-based safety system strained with the pressures of rapid downsizing, asset deterioration and increased production. Prescriptive-based regulatory approaches give a sense of security because they are comparatively simple to confirm compliance. However, whether this compliance achieves safety is more difficult to confirm – changing circumstances, such as railways saw over those two decades, can easily destroy this link.

After five Tranz Rail workers died in a 7 month period (a fatality rate eight times higher than the national worker average) the Wilson Ministerial Inquiry was initiated (New Zealand Government, 2000; Williams, 2000). The Wilson Ministerial Inquiry identified fundamental flaws in the railways regulatory approach.

> the number of [safety system] documents is in the range of 1,000 to 2,000 and the number of drawings is in the region of 100,000. It would appear that the scale of documentation is unmanageable relative to the aim of securing a safe system … The sheer extent and coverage of the [regulator] Approved Safety System renders it unwieldly and probably impenetrable to outside observers. (New Zealand Government, 2000, p.23)

This echoes the findings of a seminal 1972 inquiry of worker health and safety by Lord Robens in the United Kingdom. Robens proposed focusing on the level of safety that must be achieved (the "goal"), rather than how it was achieved (Robens, 1972). He foresaw prescriptive regulation was fatally flawed in that, as complexities grew, it would unacceptably throttle safety improvements. Businesses wouldn't be able to exploit safety advances or adopt customised approaches.

Post 2005: The way forward?
In 2005, Railways Act came into force, regulating an industry that was far different to that of the previous 140 years. Although the national rail provider returned to government ownership, its staff numbers were down to 3,500 and it operated a network of only 3,700 km (from a peak, 50 years earlier, of 5,689km). However, the wider industry had proliferated - today there are about 100 licensed rail participants using a huge variety of rail vehicles for commuting, freight, servicing, tourist and heritage purposes.

The commentary for the Railways Act did not identify it as a goal-based approach, but the principles were there. The Select Committee sought to enable a co-regulatory framework and flexibility in how safety requirements were met, and the Act imposed an overarching duty of care for all rail activities, primarily that the operator:

> .. must ensure, so far as is reasonably practicable, that none of the rail activities for which it is responsible causes, or is likely to cause, the death of, or serious injury to, individuals.

The Act put in place a bespoke regulator that oversees a licensing regime for those operating rail vehicles or controlling a network. To obtain a licence, operators must have a Safety Case approved by the regulator. The regulator has powers to conduct in-depth system assessments of the operator to verify compliance with the Safety Case and other safety documentation. The Act allows the regulator to intervene more directly if

there are immediate safety risks or if non-compliances are detected.

However, the decade following the enactment of the Railways Act 2005 demonstrated the difficulty in applying a goal-based approach on a deeply established industry without sufficient appreciation of the change it entailed. The potential of the approach was not fully recognised and the regulator was under-prepared to deliver the altered style and thinking required to fully exploit it. Particularly, the oversight of Safety Cases, a powerful tool for implementing a goal-based regime (see boxed text "*What is a Safety Case?*") was under-utilised. Instead, a process-based operating model was adopted that focused heavily on mechanically auditing activities across all operators.

Recognising the need for transformation

Following the Wilson Inquiry and passing of the new Act, railway deaths and serious injuries significantly reduced but, as has been found before, the absence of accidents is not proof of safety. There was uncertainty over the role of the regulator and the robustness of safety protections.

Change was needed, and the railway industry was fortunate in that its impetus for this change did not come from a catastrophic accident, but as part of a general push towards improved regulatory services by the Transport Agency, the industry and other government agencies, particularly in the wake of regulatory failures such as the 2010 Pike River Mining Disaster.

A number of internal and independent reports helped the Transport Agency understand where the gaps lay and became the catalyst for a multi-year improvement project that is still underway. In particular, a report by Australasian Transport Risk Solutions (2013) made 18 observations and commented:

> ... there is considerable room for improvement. This conclusion is based on the results of the international benchmarking analysis, feedback received from the stakeholders, and evidence found by the review team which suggests that the current administrative and

What is a Safety Case?

Safety Cases originated in the nuclear power industry in the late 1950s but their potential value for other high-risk, specialised industries was recognised after accidents in the chemical industry (particularly Flixborough in 1974 and Seveso in 1976) and then more widely after the Cullen Inquiry into the 1988 Piper Alpha explosion.

Principles of Safety Cases

Safety Cases are based on three principles common to most goal-based approaches (Leveson, 2011).

- Risks must be reduced below a specified threshold of acceptability
- Those who create risks are responsible for controlling those risks
- Government set safety goals and operators decide the appropriate methods to achieve those goals

The Safety Case delivers on these principles in a way that allows the regulator to focus on what is being achieved rather than how it is being achieved, while still providing a degree of assurance as to the quality of the operator's methods.

A key element of a Safety Case is that it is an argument, not a summary. An argument convinces an audience of a premise – in this case, confidence that an operator can achieve its safety commitments. As with an argument, the rationale in a Safety Case must be able to be tested. The United Kingdom's Defence Standard 00-56 notes a Safety Case to be:

> a structured argument, supported by a body of evidence, that provides a compelling, comprehensible and valid case that a system is safe for a given application in a given environment.

Because a Safety Case communicates this rationale for how the operator will keep safe, it sits apart from the management systems to provide direction and integrate them.

When a regulator intervenes in a goal-based approach, it is on the basis that the operator has not demonstrated it has developed its approach in a robust manner and so is unlikely to be able to meet its goals. The regulator is not critiquing the safety approach taken but the method the operator used to determine it.

support arrangements within NZTA for such a safety critical independent rail safety regulator function to be less than an acceptable standard. (Australasian Transport Risk Solutions, 2013, p.5)

The various reviews recommended a series of tactical changes, such as elevating the regulator in the Transport Agency hierarchy, increasing regulatory staff numbers, broadening the skill-base and performing greater analysis. However none, including the Wilson Inquiry, explicitly highlighted the need to move to a goal-based culture or the challenges this would entail.

It was only once the Transport Agency, while implementing these tactical changes, reflected more deeply on the core drivers for the problems these reviews highlighted that it began to recognise that moving to a goal-based regime in rail safety and delivering the required standard of regulatory service was a more fundamental shift.

A dramatic shift in the regulatory framework, from a prescriptive to a goal basis, can have a disorientating impact on the regulators and the regulated if not recognised and can, ultimately, lead to regulatory failure (Mumford, 2011; Black, 2014). For instance, New Zealand's leaky building crisis was partially attributed to such a change. Mumford (2011) noted that

The New Zealand Rail Industry in 2017

6,200 workers are employed by, or volunteer for, licensed rail participants in New Zealand. Many of these workers are proud to be from a long lineage of rail workers, have known rail all their lives and have seen a number of structural models come and go. The industry carries 34 million passengers and 18 million tonnes of freight every year, across 4,260km of rail network, on everything from brand-new commuter fleets to hand-restored museum pieces. Those licensed to operate railways include:

- KiwiRail, a State Owned Enterprise that employs 3,700 staff. As the national rail provider, it controls and maintains the 3,744km national rail network and operates all national freight and passenger services.
- Transdev Auckland and Transdev Wellington operate the two metropolitan commuter services, carrying 32 million passengers every year.
- Industrial businesses utilising rail to load and move freight on their sites or to service their infrastructure.
- Tourist and Heritage services operating rail services to showcase rail history and/or provide tourist experiences. Running excursions on the national network or their own railways, they operate a huge range of vehicles including full-sized heritage locomotives, trams, cable-cars, custom-built rail cars and modified golf-carts.

In addition to this, more than 200 organisations operate rail vehicles under others' licences, to provide vehicle and infrastructure maintenance services.

the haste to move away from an expensive (if reliable) standards-based approach to a more flexible regime resulted in discarding previous safeguards without adequate consideration of what was replacing them. Mumford commented:

> New Zealand moved into an unknown future while burning the bridges to its past.

To be successful, the Transport Agency needed to redefine its rail safety role, how it engaged with the industry, and how it exerted its influence over the industry.

A cultural change such as this is referred to as transformational change. It fundamentally alters the strategy by which an organisation achieves its objective. Existing skills, behaviours and approaches are no longer suitable and have to be adapted, enhanced or replaced (Cummings and Worley, 2009; New Zealand Productivity Commission, 2014).

The national rail provider was also going through its own transformational change. Along with a heavy period of asset renewal and developing new safety

approaches, it was exploring its role as manager of the national rail system under such a regulatory framework. A particular challenge for it was reconciling how its safety outcomes related to those of the operators under its supervision on the network.

Smaller operators, on the other hand, experienced difficulties in maintaining the competencies and documentation to comply with a regulatory framework more often applied to multi-national, high-risk industries than small hobbyist. They were still looking for clear, prescriptive expectations from the regulator as to how to be compliant with the safety requirements rather than moving into a goal-based mind-set.

Regulator and regulated alike were struggling to understand their respective responsibilities and approaches to meeting those responsibilities in a goal-based regulatory framework.

Making the changes

The Transport Agency took a learning, highly adaptive approach to its rail safety transformational change, rather than

implementing a pre-planned strategy. This reflected that the transformational nature of the change was only gradually recognised after the simpler, task-driven change programme had been begun. In addition, with the rail industry going through parallel changes, the approach needed flexibility to navigate a shifting environment.

In addition, the change was relatively compartmentalised within the wider Transport Agency. It sought direction from the senior leadership and values of the organisation, but it only had a transformational impact on a small number of teams who had direct roles in enabling a goal-based approach to rail safety. Achieving the change did not require a whole-of-organisation shift. As a result, although the changes were deep, they were narrow and more manageable.

Successful change required two significant perceptual changes to be made.

Roles in the regulatory framework

To understand its role in the regulatory framework, the Transport Agency had to understand what it meant for the operator to own the risks of its activities – a concept that felt contrary to the regulatory role. Regulation is enacted to provide assurance that the risks that society finds unacceptable are addressed (New Zealand Productivity Commission, 2014). It is the responsibility of the regulator to provide this assurance, and it is therefore natural for a regulator to feel most comfortable when meeting this duty directly by controlling the risk itself (for instance, by approving safety measures) rather than entrusting management of the risks to the operator. The challenge became for the Transport Agency to let go of this role and meet its duty through more indirect methods.

Some in the industry were coming to the same conclusion. The rail industry had been challenging themselves and the Transport Agency as to where responsibilities and accountabilities lay for safety, and what tools could support clearer accountabilities and allow the regulator to have confidence the industry would deliver on their safety commitments.

To enable such an approach, some regulatory tools, such as the Safety Case, needed to be recognised as being of equal, or greater, value to the industry than the

regulator – a fact commented on by Lord Cullen in the Piper Alpha Inquiry. Haddon-Cave (2009) paraphrased his observations, noting that the purpose of Safety Cases was:

> to assure [the company] that its operations were safe ... Whilst the Safety Case had a further role in demonstrating this to the regulatory body, this latter function was a matter of only secondary importance. (p.166)

Becoming a risk-based regulator

With the focus on high-level outcomes, moving to a goal-based approach facilitates the Transport Agency in becoming a risk-based regulator, as expected of all agencies (New Zealand Government, 2017). Previously the Transport Agency had taken an across-the-board approach to oversight, working across all areas of harm and pursuing serious issues as they arose. This was an ineffective approach (Sparrow, 2008; Baldwin and Black, 2007) as it spread Transport Agency resources too thinly and intervention was too transient to have lasting effect.

Again, this challenge can generate uneasiness. Becoming a risk-based regulator means consciously de-prioritising other potential sources of harm. These sources of harm may still be important, but just not as important as others. In addition, there is uncertainty in decisions as to where the greatest risk is.

The result is it places a great deal of responsibility on the regulator - what if the Transport Agency makes the wrong choice and it is a different risk that leads to the next catastrophic accident? Being clear about the evidence base (and limitations of it) and each party's accountabilities in respect of the targeted risks and general risks helps move beyond the inertia this can cause.

Reflecting these changes through Safety Cases

The Transport Agency's re-positioning of the Safety Case's role in the regulatory framework has been a core outcome of the change process. Better utilisation of this tool is both reflecting and driving many of the changed perspectives within

The RAF Nimrod mid-air explosion

The Haddon-Cave inquiry (Haddon-Cave, 2009) into the loss 14 aircrew after British Royal Air Force (RAF) Nimrod XV230 exploded in mid-air serves as one of the most well examined and illustrative studies of the potential weaknesses of Safety Cases.

The report made 12 observations, which included the following failures of the Safety Case process at the RAF

1. Safety Cases had become too long, bureaucratic and contained impenetrable detail, often simply to give a "thud factor".
2. Safety Cases gave equal attention to minor hazards as they did catastrophic hazards.
3. Safety Cases were routinely outsourced and reduced to mere back-office paperwork with little appreciation or personal interest in the subject of the Safety Case.
4. Safety Cases were a compliance document that looked for evidence to justify a predetermined answer that the system is safe, rather than look for evidence as to why it might not be.
5. Safety Cases were "shelfware", rather than living documents to keep abreast of hazards and cultural changes.

Haddon-Cave commented:

> The Nimrod Safety Case was a lamentable job from start to finish. It was riddled with errors… Its production is a story of incompetence, complacency and cynicism… The best opportunity to prevent the accident to XV230 was, tragically, lost.

the Transport Agency and the industry. The Transport Agency has gained several insights regarding its regulatory role and being a risk-based regulator through focusing on this tool.

These insights are similar to many other industries' experiences with Safety Cases, such as the Nimrod mid-air explosion (see boxed text), the Gulf Oil disaster (United States, 2011) and as surveyed by the United Kingdom Health and Safety Executive (Vectra Group Limited, 2003).

Avoid owning the risk

A Safety Case doesn't work well when used in a prescriptive way. The natural tendency is for an operator to describe how it is managing its safety. However, when a Safety Case descends into nothing more than a summary of how the safety measures are being carried out, all it offers is paper safety.

Safety Cases, in particular, require discipline by the Transport Agency to maintain its regulatory role by following goal-based principles and resist using its rail technical expertise to double-check the operator has chosen the appropriate safety approach. Instead, to ensure that an operator owns the risks of its activities, approval needs to be based on the strength of the operator's argument.

A consequence of this is that the regulator requires broad, rather than deep, expertise to assess a Safety Case. Rather than relying solely on rail and safety expertise, to critique the argument the Transport Agency staff also have to have expertise in such aspects as change management, assurance, safety systems and governance.

Underpin trust with evidence

In the traditional use of Safety Cases for heavy equipment installations, the Safety Case provides confidence by providing direct evidence of safety. However, for an

Figure 1: The Safety Case providing a trust framework

Commitment
- Have they made measurable safety commitments?
- Have they set clear accountabilities for these commitments?

Context
- Have they demonstrated that they understand the context they will operate in – particularly the risks and barriers to achieving their commitments?

Confidence
- Do they make a robust argument that their management systems can achieve safety commitments?
- Have they demonstrated that they have the determination, capability and capacity to carry out their safety activities?
- Are there the hallmarks of a strong safety culture?

Confirmation
- Can they justify their decisions?
- Is safety awareness widely embedded?
- Are there any warning bells?

organisational Safety Case like in railways, such definitive evidence is not available - particularly when first licensed.

But rather than requiring blind trust, the Safety Case provides the Transport Agency with a framework to structure its confidence around – a robust and evidenced argument, embedded in the organisation, that the operator will achieve its safety commitments (see Figure 1).

This allows the Transport Agency to better understand the value-add of its role. Its engagement with operators is about building confidence in the Safety Case argument, rather than approving the safety system approach.

As an example, approval of Safety Cases involves site visits. Previously, the operator may have thought (rightly or wrongly) that the Transport Agency was approving its specific safety activities. However, the Transport Agency visits not as auditors but to gain evidence for a more subjective judgement as to whether the operator's safety argument stands up and it will achieve its safety commitments. Regulatory staff may still observe the adequacy of a rail vehicle or the network control approach, but as part of building a picture of the organisational competence, along with their observations of more general aspects

such as integration, communication and capability.

A framework-based approach also helps the industry understand they have to earn that trust – it's not just a case of "hands-off regulation".

Simplify but don't compromise safety cases
The Railways Act has imposed a sophisticated regulatory approach over an industry that includes operators with only basic competencies and comparatively low risks. The original users of Safety Case approaches were high risk, heavily resourced and complex operators – such as nuclear, chemical and extractives industry. Parts of the rail industry are, in contrast, hobbyists. This challenge has been observed in other sectors where Safety Cases or similar tools have been applied homogeneously over a diverse industry (Deighton-Smith, 2008).

Some rail operators may have the right approaches and culture in place, but struggle to join them up as a system and demonstrate it on paper. An operator may simply not have the competency to develop bespoke safety solutions and so rely on standard industry practices. It can be argued that a more prescriptive approach should be applied to such operators (Deighton-Smith, 2008).

However, the Transport Agency is confident that, given these operators still

face complex risks, the flexibility and safety-focus of a goal-based approach remains more effective. In essence, a good Safety Case is as simple as proving an organisation can make good decisions.

Focusing its efforts according to risk, the Transport Agency is looking towards pragmatic solutions that simplify requirements without losing the core principles of Safety Cases. This is not about turning the Safety Case back into a safety system summary or providing detailed templates that result in a paint-by-numbers exercise. The Safety Case still has to demonstrate the operator's own safety argument for it to have any value.

Conclusions
The move away from prescriptive regulation to the effective use of goal-based tools such as Safety Cases has both empowered and challenged the Transport Agency to better carry out its role in achieving the Government's objectives for rail safety. To be successful it had to recognise that the transition is not just a matter of better regulatory practice, but organisational transformation – for both the regulator and the regulated.

The Transport Agency is still undergoing this journey, but is already recognising important lessons:
1. The move to goal-based legislative approaches is positive for safety, but the cultural shift required should not be underestimated – transformational change approaches should be adopted and a learning environment encouraged.
2. The industry needs to be involved – it is not something the regulator does behind closed doors.
3. As a cultural shift, the change has to be deep but it can be achieved through a focus on the critical regulatory staff, rather than organisation wide.
4. Being a goal-based regulator is an uneasy experience – assurance of safety is based on trust (underpinned with evidence) in the capability and willingness of the regulated party, rather than having the ability to dictate the "right" solution.
5. Goal-based regulatory approaches support the transition towards

risk-based regulation by stressing the operator's overall accountability for their risks and allowing the regulator to focus on the high-level outcomes. Safety Cases and goal-based legislation are not an automatic panacea to organisational safety. Various inquiries, surveys and the Transport Agency's own experiences have highlighted that a cultural transformation among the regulator and the regulated community is what enhances safety. A Safety Case helps demonstrate this has been achieved – it doesn't create it. As Lord Cullen commented (Jeffrey 2013):

A Safety Case should reflect the organisation's safety culture. If that culture is sound and healthy – it should show.

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Kirsty Hutchison, Katherine MacNeill, Peter Mumford and Val Sim

Managing the Opportunities and Risks Associated with Disruptive Technologies

space law in New Zealand

A key challenge for regulators is how to enable entrepreneurship and innovation while managing the risks associated with rapidly evolving technologies and associated market change. A number of technologies could be used to illustrate this problem, such as the internet, gene editing and driverless vehicles. However, the Ministry of Business, Innovation and Employment (MBIE) recently had to face this specific issue in relation to space activities.

Space was once the domain of a small number of nation states and large corporations. This reflected that only a few players had access to the advanced technologies required to launch objects into space, or could afford the significant investment associated with building, launching and operating satellites. Today, many more players are able to access space. Advances in technology have enabled the production of smaller, cheaper and more powerful satellites. The standardisation and mass production of small satellites have also reduced barriers to entry and driven innovation in space-related services and applications.

Growth in the small satellite industry has in turn created demand for small satellite launch vehicles. Developments in space technologies and space business models means that space is now open to a new generation of entrepreneurs and enthusiasts, and countries around the world are keen to share in the full range of economic development and social benefits that space offers.

In 2015 the New Zealand government decided to enable space launches from New Zealand

Rocket Lab, a United States corporation with a subsidiary in New Zealand, is the main commercial player in New Zealand's emerging space industry. Rocket Lab has developed the Electron space launch vehicle to provide a dedicated launch service for small satellites. The company's mission is to remove commercial barriers to space. Rocket Lab recognised that New Zealand offered an attractive location for space launch activities, due to our innovation-friendly business environment, strong science and

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research and development system, skilled workforce and suitably remote geography (including low volumes of air and sea traffic).

Space is a multi-billion dollar global industry and it has huge strategic importance. Satellites enable the provision of critical everyday services and infrastructure, including banking, transportation, electricity, telecommunications, navigation, remote sensing and national security. The industry is an important source of innovation and high-tech and high-value jobs. The development of a New Zealand-based space industry would enable New Zealand to participate directly in this new economy and ensure that all New Zealanders could benefit from the opportunities that the use of space and our participation in the global space economy have to offer. However, New Zealand had no specific space regulation, in contrast to many other countries.

In a little under two years New Zealand has gone from having no national space law to having a new act to regulate New Zealand space activities. The Outer Space and High-altitude Activities Act was passed in July 2017. The act governs the launch of space objects such as rockets and satellites into outer space from New Zealand (and by New Zealanders overseas) and it regulates launch facilities. The act also introduces a regime to manage certain high-altitude activities that take place from New Zealand, such as high-altitude balloons. (High-altitude vehicles operate above controlled airspace but do not go into outer space.)

This article sets out the main steps in the process of developing the new regulatory regime and describes the key considerations that influenced the content of the regime.

Legislation was necessary to meet New Zealand's international obligations associated with space activities

One of the first steps in the process was to assess whether New Zealand's existing domestic law was adequate to manage space activities or whether a new law would be required. It quickly became clear that a new law was needed to ensure that we could comply with certain international obligations and manage risks associated with space activities (including risks to safety, the environment and national security).

International space treaties
In the 1960s and 70s, New Zealand ratified three international space treaties:
· Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies – ratified 1968;
· Convention on International Liability for Damage Caused by Space Objects – ratified 1974;
· Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (the Rescue Agreement) – ratified 1969.

At the time that these treaties were ratified, New Zealand's policymakers and legislators clearly deemed legislation unnecessary to implement them. As noted above, at the time space activities were carried out by states rather than commercial operators, and New Zealand policymakers could be confident that no national space activities were taking place.

Fifty years later, Rocket Lab's activities provide a graphic illustration of how developments in technology have changed the space industry and made it accessible to a wider group of participants. This necessitated a change of view on the need for legislation to implement the rights and obligations of the space treaties. It also led us to consider how to ensure that legislation would provide a balance between risk management and not inhibiting economic development and innovation. This is discussed further below in the context of the two determinative international space treaties.

The Outer Space Treaty
The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (known as the Outer Space Treaty) provides the principles that govern the exploration and use of outer space. It requires that the exploration and use of outer space, including the moon and other celestial bodies, is carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and is to be the province of all mankind. Outer space, including the moon and other celestial bodies, is to be free for exploration and use by all states without discrimination of any kind, on a

If space launches were to take place from New Zealand, a new law would be necessary to implement the international space treaties.

basis of equality and in accordance with international law, and there is to be free access to all areas of celestial bodies.

There are also restrictions on certain activities in space, such as placing nuclear weapons or weapons of mass destruction in orbit or installing military bases on celestial bodies (some of which found their way into the purpose statement in the legislation). To this end, the Outer Space Treaty imposes a number of obligations on states. Most importantly, article VI imposes international responsibility on states for their national activities. It is clear from the Outer Space Treaty itself, and to a lesser extent from the terms of the later Liability Convention (discussed below), that national activities include the launch of space objects from New Zealand and the launch of space objects by its nationals.

If space launches were to take place from New Zealand, a new law would be necessary to implement the international space treaties. The legislation would also need to have some extraterritorial effect. This is because, under the Outer Space

Treaty, each party bears international responsibility for its national activities in outer space, whether those activities are conducted by public or private entities and whether they are conducted in New Zealand or in another jurisdiction.

The Liability Convention
Under the Convention on International Liability for Damage Caused by Space Objects (known as the Liability Convention), the launching state is absolutely liable to pay compensation for any damage its space objects cause to other parties, or to third states, on the surface of the Earth or to aircraft in flight. Liability for damage caused elsewhere

overall design of our domestic legislative regime.

The Technology Safeguards Agreement (TSA)
In order for Rocket Lab to commence space launch activities from New Zealand, it had to seek approval from the United States government to transfer sensitive technology to New Zealand. The US would only allow the transfer of this technology if New Zealand concluded a treaty-level Technology Safeguards Agreement with the US government.

The TSA imposes certain obligations on New Zealand in relation to the safe and secure transfer, use and management of US space launch technologies. The

Act and the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act) would be adequate to manage safety and environmental risks in New Zealand. However, the novel aspects of space activities in New Zealand meant that there are other interests that needed to be considered and built into the design of the New Zealand regime.

For example, the long-term sustainability of the space environment and the management of orbital debris have become increasingly important internationally, given the increase in space activities and the significance of space applications to modern societies. This needed to be factored into New Zealand's domestic regime.

In addition, issues around national security are highly relevant. Space applications have the potential to benefit, and also pose risks to, national security. Many space technologies are dual purpose, which means that they can be used for peaceful as well as military objectives. A new domestic law was needed to allow the benefits but also put in place appropriate safeguards to ensure that space activities were aligned with New Zealand's national interests, including its national security.

> One of the biggest challenges with new technologies is that innovative activities or products … rarely become visible to governments in time for governments to legislate before they are ready to emerge.

– for example, after a space object is launched into orbit – is fault-based. The term 'launching state' means '(i) A State which launches or procures the launching of a space object' and '(ii) A State from whose territory or facility a space object is launched'.

Having discussed the interpretation of the Liability Convention with our counterparts in a number of overseas jurisdictions, it became apparent that states are struggling to interpret the international liability rules in a world where, increasingly, space activities are carried out by commercial rather than state actors. Perhaps even more importantly (since the Liability Convention has been invoked on only one occasion),[1] the way in which states have dealt with the international liability in their domestic regulation has had an effect on the competitiveness of space regimes and their effectiveness in establishing a domestic space industry. As discussed below, these were important factors in the

majority of the obligations on the New Zealand government are to ensure compliance by Rocket Lab and third parties, such as Rocket Lab's contractors, with the provisions of the TSA.

The TSA also protects New Zealand's laws and sovereignty over space launch activities from New Zealand. New Zealand is able to veto launches from New Zealand that are contrary to our domestic laws, regulations and policies. While many of the obligations under the TSA could be managed through contractual arrangements with Rocket Lab and the existing criminal law, legislation was necessary to fully implement the TSA.

Legislation was necessary to manage risks associated with space activities
As noted earlier, space activities create risks to public safety and the environment. For the most part, we anticipated that New Zealand's existing laws (including the Health and Safety at Work Act, the Resource Management

The risks associated with space activities needed to be managed while a new regime was being developed
One of the biggest challenges with new technologies is that innovative activities or products, while they might take time in development, rarely become visible to governments in time for governments to legislate before they are ready to emerge. This was the case with Rocket Lab. There was no real opportunity to legislate for its space activities before its planned first launch.

The solution was to regulate Rocket Lab's activities through a contract until legislation could be enacted. This allowed the government to pass on the requirements under the TSA through its contractual arrangements and to manage the risks associated with Rocket Lab's activities while the legislation was developed. In this respect, the government reserved the ability to veto any launch of a space object that would not be in the national interest during the

contract term, the intention being that licensing requirements would be in place by the time the contract expired (with careful arrangements to manage the transition).

A contract cannot be a substitute for legislation. A contract is only binding on the parties to it. While it applies directly to Rocket Lab, Rocket Lab can only regulate its customers indirectly through its ability to veto their payload. In addition, criminal offences can never be created by contract. However, it has proved to be a very valuable tool for managing Rockets Lab's activities pending the development of legislation and its coming into force.

There was another advantage of regulating Rocket Lab through the contract. We did not necessarily expect this at the time, but it seems obvious with the benefit of hindsight. It gave us an opportunity to engage with our international counterparts without hindering Rocket Lab's activities. That meant that we could benefit from the knowledge and experience of our international counterparts and bring it to bear when developing our domestic legislation.

It was also important to take account of developments in international space law and practice

A key consideration in the development of New Zealand's space law was to ensure that it was informed by international space law and practice. This was important to ensure that we developed an internationally credible regime that positioned New Zealand as a responsible player in the international space community. Aligning the content of New Zealand's space law with international best practice would also ensure that we could conform to our international obligations.

In addition to reviewing the approaches taken in other jurisdictions, we also engaged Professor Steven Freeland, an international space law expert at the University of Western Sydney, to give us the benefit of his knowledge and experience.

International practice is for countries to put in place licensing or permitting systems that provide the necessary controls over participation in space activities, including powers to prevent or stop space launches in appropriate circumstances. A licensing regime also enables financial risk to be transferred to where it can best be managed, a key consideration given our obligations under the international space treaties. However, the approach taken to the new regime was not solely concerned with managing risk, but rather about managing opportunity and risk.

Space activities create opportunities for economic development and innovation

In order to quantify the opportunities for New Zealand arising from Rocket Lab's activities, MBIE commissioned

Sapere Research Group to undertake an assessment of the economic benefits of the development of a space launch industry in New Zealand. Sapere's report (June 2016) estimated that Rocket Lab could contribute between $440 million and $1,550 million to New Zealand over 20 years. The Sapere report focused primarily on launch activities. The benefits from a satellite industry could be significantly higher.

The establishment of a rocket industry in New Zealand presented a strategic opportunity to build New Zealand's capacity and expertise in space activities. Over time, the benefits could include the potential for different launch providers to operate out of New Zealand, as well as for New Zealand to design, manufacture and launch its own satellites. The decision to have the minister for economic development as the responsible minister under the act (albeit to be reviewed in three years) indicates the importance that the government places on the economic and innovation benefits of space activities.

Although the law had to manage risk, it was important that it did not inhibit economic development

The content of the new regulatory regime is conditioned by what is necessary to comply with New Zealand's international obligations and to manage risk. However, we had choices around how prescriptive or permissive the regime was.

A prescriptive approach

If the primary objective was to manage risk, the government might have adopted a prescriptive approach, with detailed provisions in the primary legislation that specified requirements pertaining to implementation of our international obligations (including liability), safety

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and the environment. The advantage of this approach is that it provides space industry participants with certainty in the short term about what requirements they have to meet. However, there are certain disadvantages with a highly prescriptive approach. Having detailed requirements in the primary legislation would also limit the ability of the law to adapt to rapidly evolving space technologies and new markets. This reduces flexibility, which imposes unnecessary costs for industry and increases the risk of the law becoming obsolete. A prescriptive approach also requires the regulator to have detailed knowledge of the activities being regulated. This was not practicable given that space activities were new to New Zealand.

An example of a prescriptive approach to space law, particularly in relation to questions of liability and insurance, is provided by Australia's Space Activities Act 1998 (part 4). However, it was relevant to our consideration of this approach that the Australian government had announced a

review of their act.[2] The rationale for the review included the fact that space technologies had advanced significantly since the act was introduced and there was a need to ensure that Australia's space regulatory regime was facilitative of innovation and investment in this growing industry whilst effectively meeting Australia's international obligations in managing the space environment.

A performance-based approach
The alternative to a prescriptive approach is a performance-based approach. Performance-based regulatory regimes focus on setting intended outcomes that

Performance-based regimes are … more likely to facilitate innovation and to avoid unnecessary regulatory compliance costs.

must be achieved, rather than prescribing detailed processes and procedures to be followed. Performance-based regimes are therefore more likely to facilitate innovation and to avoid unnecessary regulatory compliance costs.

A performance-based approach to the primary legislation allows the regulator's decisions to be tailored to particular cases. It is therefore more amendable to changes in technology, risks and market conditions. The more prescriptive elements that are required are provided for in regulations, which are more easily changed than primary legislation, and in guidance.

One important consideration in relation to designing a performance-based regime is that while performance-based regimes apparently avoid imposing unnecessary compliance costs on industry, if a regulator is truly going to be able to tailor decisions to individual cases, a significant investment is required in regulatory capability. Without that, it is not possible for the regulator to do their job adequately.

Recognising that MBIE currently has limited technical competence in relation to space activities, the new act (s51) allows the responsible minister to take into

account whether an applicant has an overseas license when considering whether to grant a New Zealand license (this is discussed in more detail below). In the initial two–three years of the regime we expect to rely on foreign licensing organisations in considering the safety and technical competence of space launch vehicles and payloads. This will provide time for the New Zealand regulator to build up the necessary technical expertise and regulatory capability. We will not rely on foreign licensing organisations to undertake national interest or national security analysis, however, as this will be a New Zealand-centric question.

The act establishes a flexible regime with a presumption in favour of economic development
The government's preferred approach was for a flexible, outcomes-based regime which would manage opportunities as well as risks. Consistent with this, the act provides for:

· a decision-making framework of which one of the purposes is to facilitate the development of a space industry;
· an ability to treat authorisations granted in a country other than New Zealand as meeting the requirements of the act;
· risk-based and proportionate decision making that tailors requirements to allow a graduated approach to risk management rather than a one-size-fits-all approach – e.g. flexibility to set conditions; and
· future-proofing to accommodate changes in technology and markets.

A decision-making framework with economic development as one of the objectives
Having regard to the economic benefits of space activities outlined earlier,

providing for economic development was a key consideration in the development of the act. For this reason, the objective to facilitate the development of a space industry was built into the purpose statement of the act. Section 3 of the act states that the purpose of the act is to:
(a) facilitate the development of a space industry and provide for its safe and secure operation:
(b) implement certain international obligations of New Zealand relating to space activities and space technology:
(c) without limiting paragraph (b), implement the obligations in the Outer Space Treaty not to –
 (i) place in orbit around the Earth any objects carrying nuclear weapons or weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner:
 (ii) establish military bases, installations, or fortifications on celestial bodies:
 (iii) test any type of weapons or conduct manoeuvres on celestial bodies:
(d) manage any potential or actual liability that may arise from the space industry:
(e) establish a system for the regulation of space activities and certain high-altitude activities:
(f) preserve New Zealand's national security and national interests.

The act also gives power to the minister for economic development to issue licences for space activities: launch licences (i.e. licences for launch companies, such as Rocket Lab, that launch space objects into space) (ss7, 23), payload permits (i.e. permits for satellites that will be launched by companies such as Rocket Lab) (ss15, 31), launch facility licences (on the assumption that in the future there could be space ports with a different person operating a launch facility than the person who carries out the launch) (s38) and high-altitude vehicle licences (vehicles that operate at very high altitudes are increasingly innovative, with some carrying out much the same activities as satellites) (s45).

The minister must decline licences if he or she is not satisfied that certain risks are not being managed, and may decline a licence if he or she considers that the launch is not in the national interest. The minister has been given an explicit power to weigh up the economic benefits associated with the activity against other national interests when determining whether a licence should be declined on national interest grounds (clauses 2 and 3 of ss9, 17, 25, 33, 40, 47).

An ability to recognise overseas licences
One of the ways the act keeps compliance costs down is by enabling the decision maker to take into account foreign licences for the activity when deciding whether to grant a licence for launches, payloads or launch facilities. This approach has also been taken to enable New Zealand's space regime to operate effectively from day one – recognising that the initial applications for a New Zealand licence will come from Rocket Lab and its customers, who are subject to the US licensing regime.

The ability for foreign licences to be taken into account has influenced the nature of the regulations, particularly the nature of the information that needs to be provided with licence applications. For example, there is no need for an applicant to provide information to satisfy the minister that the applicant has the technical capability to carry out an activity, that the activity is safe, or that orbital debris mitigation requirements will be met if a competent body in another jurisdiction has already undertaken this assessment. The aim of this is to reduce unnecessary duplication and cost. International cooperation arrangements with certain foreign regulators will facilitate this aspect of the regime.

Risk-based and proportionate decision making
The act provides that the decision maker may grant a licence if he/she is satisfied that certain threshold tests have been met.[3] These tests address key risk areas associated with space activities, such as risks caused by an applicant's lack of technical capability, risks to public safety, risks to the space environment and risks of breaching international obligations.

The detailed requirements imposed in relation to these tests are prescribed in the regulations that support the act (the Outer Space and High-altitude Activities (Licences and Permits) Regulations 2017). As outlined above, the minister can also decline a licence if he or she considers that it is not in the national interests.

However, the primary legislation also enables the decision maker to apply a graduated approach to risk management. For example, flexibility is provided through the ability to set licence conditions that can be varied according to the circumstances.

Discretion is also explicitly provided for in the language of the act. For example, with respect to managing New Zealand's

> One of the ways the act keeps compliance costs down is by enabling the decision maker to take into account foreign licences for the activity when deciding whether to grant a licence for launches, payloads or launch facilities.

potential liability, the act provides that the minister may require a licensee, as a condition of the licence, to indemnify the Crown in whole or in part against any claim brought against the Crown under the Liability Convention or the Outer Space Treaty, or any other claim brought against the Crown under international law (ss10, 18, 26, 34). The experience in other jurisdictions has been that, unless the liability/indemnity regime is properly managed, innovation is easily stifled. The minister's ability to set tailored indemnity/insurance requirements having regard to the nature of the risks associated with the particular launch is intended to ensure that innovation is not stifled by onerous insurance requirements that are not justified by the risks associated with the activity.

Future-proofing the act to deal with emerging technologies and activities
During the development of the space

regulatory regime we became aware of a range of new technologies being developed to operate at very high altitudes (above the upper limit of controlled airspace) and performing similar functions to satellites, including Earth observation and internet connectivity. In order to future-proof the space activities regime for these new technologies, and to ensure that similar applications and services provided by different technologies are treated consistently, the act brings high-altitude vehicles within scope of the regulatory regime. New Zealand is the first country in the world to establish a high-altitude activities regime to govern these activities.

The act's regulation-making powers also provide the necessary scope to deal with changes to technologies and markets. For example, the act establishes regulation-making powers to prescribe that a thing is or is not, for the purposes of the act, a launch vehicle, a space object or a high-altitude vehicle (s88(1)(11)).

While powers of this kind that allow regulations to override a statute (often described as Henry VIII clauses) are generally frowned upon, both the Legislation Advisory and Design Committee and subsequently the Foreign Affairs and Defence Select Committee accepted that in areas such as this, where legislation struggles to keep up with rapid innovation, broad regulation-making powers are justified (albeit with safeguards, such as consultation requirements and a requirement for reasons) (s88(1) and (2)), which were incorporated into the legislation at the suggestion of the Legislation Advisory and Design Committee.

Carrying through the philosophy of the act into implementation

The act comes into force on 21 December 2017. Regulations to support the act come into force on the same day. Although the act contains broad regulation-making powers, not all of them must be used initially or are relevant for every activity; they have been built into the act to future-proof it and to enable a flexible approach to managing risk. However, certain regulations are necessary to implement the act when it comes into force. These include:

· requirements for licences and permits, particularly the information that applicants provide;

> ## While the potential for conflict between Rocket Lab's activities and the interests of airlines and shippers is minimal, if space activity increases this may become an issue with which we will have to grapple.

· requirements for orbital debris mitigation plans;
· requirements for safety cases for launch licences, launch facility licences and (non-aircraft) high-altitude vehicles;
· the circumstances in which certain vehicles that go into high altitude are not high-altitude vehicles and hence won't require a licence.

The decision about what went into the act and what went into the regulations was informed by the Legislation and Design Committee guidelines on the allocation of power between Parliament and the executive. In times of rapid innovation and technology change, the ability to change the law quickly is one of the most important considerations in this allocation of power. In the case of space activities, we were confronted not only with rapidly evolving technology but also with evolving standards internationally, which made the ability to be able to change the law quickly essential. For that

reason, some important aspects of the law, such as the requirements for orbital debris management and safety cases for space activities, were left to secondary legislation. The approach taken in the regulations – for example, to prescribing requirements for orbital debris mitigation plans and safety cases – is consistent with the outcomes-based approach in the primary legislation.

The regulations were developed in close consultation with other New Zealand government agencies which will be involved in undertaking the assessments required by the act, and with prospective applicants to ensure that the regulations provided the necessary degree of certainty and transparency whilst not imposing unnecessary compliance costs.

Orbital debris mitigation plans

Orbital debris poses a significant threat to sustainable access to space and New Zealand wants to position itself as a responsible regulator by ensuring that space activities from New Zealand do not unacceptably contribute to the problem. However, it is also important that New Zealand does not prescribe detailed orbital debris mitigation requirements which could have the effect of deterring space activities from New Zealand and potentially inhibit innovative approaches to managing orbital debris.

The regulations prescribe the high-level outcomes that a debris mitigation plan would need to achieve, consistent with international best practice (regulation 13). The outcomes proposed are:

· limitation of debris released during normal operations;

· minimisation of the potential for on-orbit break-ups;
· minimising the risk of collision;
· minimising the risk on Earth and in space through post-mission disposal.

Specifying the outcomes in regulations provides certainty for applicants about the outcomes that the debris mitigation plan will need to achieve while also providing flexibility about how the requirements are met. There are a range of international norms and standards for orbital debris mitigation that will meet these outcomes. These include the United Nations Debris Mitigation Guidelines, the Inter-Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines and the International Standards Organisation (ISO) 24113. However, as the standards are evolving and there is not yet a single internationally recognised standard, it is not practicable to enshrine a particular standard in regulations. Instead, the regulations will require an orbital debris mitigation plan to state what standards have been applied and whether the plan has been independently verified.

Safety cases

The requirement for a safety case (schedule 3(10)) puts in place the regulatory mechanisms to enable the regulator to be satisfied of the safety of the proposed activity. At the highest level, the safety case provision will require the applicant to identify their approach to managing safety, including ensuring that known significant risks are identified and appropriate controls in place.

To inform what should be required for a safety case we looked at the regulations developed to manage safety in other regimes dealing with high-risk activities, such as the Health and Safety at Work (Major Facilities Regulations) 2016 and parts of the Railways Act 2005. From these we distilled the key elements that applicants will be required to include in a safety case. However, as space activities are new to New Zealand, the safety case requirements have been pitched at a relatively high level. On balance, we judged that this was preferable to setting highly detailed requirements upfront which might stifle innovation, and also

carried high risks of us getting it wrong. This is consistent with the approach taken more generally in relation to the regulations.

Learning as we go and adapting the regime as required

It is not often that you get to develop a new regulatory regime from scratch, let alone a regime that has to balance obligations arising from international treaties entered into 50 years ago with the present-day challenges of regulating an industry undergoing rapid technological and market changes.

We will continue to work with other New Zealand regulators who can bring knowledge and expertise about different aspects of the regime, including the Ministry of Transport, the Civil Aviation Authority and WorkSafe New Zealand. We will also build our relationships with overseas space agencies and regulators.

In order to implement a responsive regulatory regime, we will also continue to work with industry players and space participants to build relationships and ensure that people understand New Zealand's regulatory requirements. A key focus for MBIE as the regulator is to ensure that we can meet industry's expectations of a responsive regulatory regime while we build our knowledge and capability. This will also ensure that our recommendations to ministers about any conditions on licences are commensurate with the risks posed by the activities.

MBIE will also be interested in public/community expectations of the way that the space regime works. Associated with this is how trade-offs are made between objectives related to the space regime and other regimes, such as the Civil Aviation Act 1990 and the Maritime Safety Act 1994.

An issue we identified early on as something to monitor is the potential for competing interests in the use of airspace and the sea between space activities and aviation and maritime activities. While the potential for conflict between Rocket Lab's activities and the interests of airlines and shippers is minimal, if space activity increases this may become an issue with which we will have to grapple.

The act requires that there be a review as soon as practicable after the expiry of three years from the commencement of the act (s86). This will provide an opportunity to adjust the primary legislation to take account of new developments in technology and/or changes to international space law and practice, as well as (we hope) a wealth of experience gained from regulating a New Zealand-based space industry.

1   The Liability Convention was invoked by Canada through diplomatic channels after the re-entry and subsequent crash of the RORSAT Kosmos 954 on 24 January 1978 in north-west Canada, and led to a settlement for the costs of the clean-up and damages.
2   The review of the Space Activities Act 1998 was announced by the minister for industry, innovation and science on 24 October 2015.
3   Even if satisfied of these matters, the minister may not issue a licence if he/she is not satisfied that the launch is in the national interest, or if national security risks have been identified, which would result in the issuing of a certificate with the effect of vetoing the proposed activity.

Matthew Boyd and Nick Wilson

Rapid Developments in Artificial Intelligence

how might the New Zealand government respond?

'Faced with the possibility of an intelligence explosion, how can we maximize the chances of a desirable outcome?' — Chalmers, 2010

Introduction

Advances in artificial intelligence (AI) have opened opportunities in a range of human endeavours (NSTC Committee on Technology, 2016). In response to the speed of these developments there has been a burst of analysis and dialogue in New Zealand. The New Zealand Institute of Directors commissioned a white paper (Chapman Tripp, 2016); the Ministry of Business, Innovation and Employment published *Building a Digital Nation* and the Strategic Science Investment Fund 2017–24 business plan (Ministry of Business, Innovation and Employment, 2017, 2016), and supports the new Artificial Intelligence Forum of New Zealand (www.aiforum.org.nz).

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Intelligent systems are here and are likely to bring about a 'fourth industrial revolution' (Government Office for Science, 2015; Helbing et al., 2017; NSTC Committee on Technology, 2016). Systems with general intelligence, more capable than humans at most tasks, are more probable than not within 20–30 years (Muller and Bostrom, 2016). According to Nicholas Davies, head of the World Economic Forum society and innovation department, such systems will 'fundamentally change the way we create value and do business, and value ourselves as human beings' (New Zealand Herald, 2017).

AI is a global issue and presents great opportunities for benefit, but also great risk. Risks range from economic to social and psychological, to existential. We argue that these risks are insufficiently articulated in New Zealand government reports to date, and there is an obligation

for New Zealand government agencies to consider deep questions about the kind of society we wish to live in and our role in the emerging global transition to an AI world. We explain AI briefly, identify four key risks that the policy response needs to reflect, and conclude that New Zealand needs to support serious research into the risks of AI. We need informed debate, formal public engagement and emergent policy.

What is AI?

AI systems are digital systems that automate or replicate intelligent behaviour. AI systems use data to infer patterns and learn solutions to problems. Programmers provide AI systems with goals rather than strict methods. Present intelligent systems may augment the intelligence of a user, or provide domain-specific expertise (narrow AI). AI development also has the potential to produce artificial general-purpose intelligent systems (AGI) – even sentient systems according to some speculators.

One reason AI has such enormous potential is that the world has been stockpiling information. This information takes the form of our internet search histories, purchase histories, social media posts, blogs, media reports, GPS data, government databases, marketing databases, sensor databases; any form of data you can imagine that is stored digitally. The quantity of information available is doubling year on year (Helbing et al., 2017; IBM, 2016). Such vast data sets arise in part because of the 'surveillance capitalism' that pervades the globe (Zuboff, 2015). We have created a rich representation of social reality, filled with sequences of cause and effect, associations, beliefs, emotions, goals, hopes, dreams, memories and behaviour. These data are what AI systems learn from and the methods and rules that AI employs in learning and making inference are often opaque to human observers.

AI brings great economic and social possibility, with potential for deep insight and productivity gains, novel methods, delegation of decision making to automatic systems, task competence exceeding expert humans, and the possibility of artificial superintelligence

capable of things we cannot yet conceive. If we soon design AI systems that are very much better than humans at designing AI systems then an explosion of intelligence may occur spectacularly thereafter. Rapid evolution of intelligence may occur as well through Darwinian selective processes (Association for Computing Machinery, 2017). But subsequent generations of AI may contain 'bugs' that lead to unforeseen consequences, which humans are unable to remedy.

The applications of AI are catalogued elsewhere (Chapman Tripp, 2016; Government Office for Science, 2015; IBM, 2016; NSTC Committee on Technology, 2016). It is very clear that AI will influence policy, but we need policy

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about AI. Policy around AI is going to have to be flexible to accommodate rapid change and will need to be based upon principles of upholding core societal values.

In this article we intentionally avoid the kind of 'theological speculation' found in many radical assessments of AI (Chalmers, 2010; Muller, 2014), and focus on the social and personal risks of rapid, unfettered development and implementation of AI.

What are the plausible risks of AI?

Broad and non-specific risk statements are easy to ignore. Details matter and are necessary. Inspired by the New Zealand Institute of Directors report, we now elaborate on the potential for AI to radically transform our world. We cannot catalogue all the risks of AI here, so we have chosen four particularly challenging risks, not yet detailed in key New Zealand policy documents.

The risks of bias and injustice

Algorithmic bias leads AI systems to demonstrate unexpected behaviour on occasion. Microsoft's Twitter chatbot learned to be racist from human data sets (Devlin, 2017; Gibbs, 2016). AI is not immune to human prejudice (IBM, 2016). The public may be much less forgiving of a biased machine than a biased individual, especially in critical domains.

The New Zealand government makes use of an integrated data infrastructure (IDI) to help target social investment by using past data to predict likely actions or qualities of different groups. Certain objective facts about individuals make the probability of them needing social assistance very much higher (McLeod et al., 2015). Statistical profiling is also used in insurance, law enforcement and many other domains. The IDI is a governmental database, and subject to government ethics, but databases outside government control do not necessarily benefit from such protection. Even within government, ethical checks may not always occur in intelligence or law enforcement activities. This is especially a risk if humans don't fully understand the systems. Even ethical safeguards may not be able to overcome the bias of machines that learn from human data sets.

Sophisticated AI systems, analysing the stockpile of data representing the structure of human social reality, may infer great insight about the probabilities of risks to individuals, augmenting human social work, police work or health care and improving human decisions through prescience. Social media can already be used to predict some future events (Phillips et al., 2017).

A UK government report on AI states that 'at present there is generally agreement that there should be a human in the loop … the nature of their role is likely to evolve as the technology develops' (Government Office for Science, 2015, p.10). What happens when AI is demonstrably more reliable than human decision makers? Do we remove the human from the loop? No system of prediction is perfect and the inference rules of AI systems may be inaccessible to human understanding. Ought such systems be used in insurance, law enforcement, social investment, or in the interests of profit? What happens when human decisions and AI conflict? New

Indeed, our psychology is already exploited by advertising, propaganda and rhetoric. Connectivity and digital platforms make it much easier to share and spread information. It can be relatively easy to manipulate the public's perception of reality, and technological manipulation of public opinion is a daily occurrence. The 'fake news' phenomenon illustrates this (Gu, Kropotov and Yarochkin, 2017; Woolley and Howard, 2017). In 2017, 45% of Twitter activity in Russia was estimated to be automated (Woolley and Howard, 2017). Furthermore, content is also becoming more individualised.

Private and public entities already use

potential to undermine not only truth, but free will, autonomy and democracy (Helbing et al., 2017). If the AI systems of interest groups become proficient at exploiting patterns of cause and effect we aren't even aware of, reality may recede in a storm of artificial content while we remain oblivious to our own manipulation (Woolley and Howard, 2017).

It may be that attempts to control opinions are doomed to fail; however, what results from such attempts is unpredictable. No one knows where 'persuasive computing' and 'computational propaganda' may lead us.

The risks of economic chaos and the transformation of work

AI has the potential to massively disrupt our core economic systems. Many reports detail mass unemployment due to automation. New jobs created may not be jobs that New Zealand's labour market is equipped to capitalise upon. A 2017 OECD report cited New Zealand's low productivity and weakness in mathematics as barriers (OECD, 2017). The twin forces of job loss and profit gain create widening inequality. This is a major policy concern given the relationship between socio-economic conditions and health (Marmot and Allen, 2014).

Whether society values something, or someone, is contingent on the norms, beliefs and needs of the time (Sandel, 2010). There is a risk that present systems will become unfair with the arrival of AI. A new and just distribution of resources is needed as many workers begin to suffer through no fault of their own. We risk having large numbers of economically valueless citizens and a minority of technologically literate people acquiring unprecedented wealth and influence.

No one really knows where this will end up. But the endgame of an intelligence explosion might be a post-scarcity economy, where economic growth rates increase dramatically (Bostrom, Dafoe and Flynn, 2016), supply outstrips demand and the value of money collapses (Starkey, 2017). One possible solution to this issue is a universal basic income funded by taxing robots that supplant human workers (James, 2017; Nauman, 2017). This is the preferred position of

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Zealand's chief science advisor Professor Sir Peter Gluckman notes that:

> While prediction based on risk factors is a key objective … such predictive approaches will identify risk and resilience factors based on group characteristics and there are significant limits and dangers in extrapolating this to a specific individual. (Morton, 2017)

These situations (which could involve issues of health care or prejudice) raise significant questions about liability, control, fairness, privacy and society. Will we, and ought we to, accept more and more delegation of authority to machines?

The risks of AI dominance of media discourse
Human rationality is bounded. We are subject to biases and heuristics of thinking that control the information we believe and may confound our best intentions (Gigerenzer, 2008; Kahneman, 2011; Richerson and Boyd, 2004). This means that our psychology is exploitable.

'big nudging' to provide information that exploits the relationship between psychological biases and behaviour (Benartzi et al., 2017). Such 'mind hacking' works probabilistically on a population level. We also know that 'fake news' can drive real behaviour.

Psychological exploitation is possible on an unprecedented scale with the help of intelligent machines exploiting the structure and function of social media and vast data sets. For example, a Trend Micro report claims that it costs $200,000 to generate fake social media and authentic-seeming news that results in a real-life demonstration about an issue that doesn't exist (Gu, Kropotov and Yarochkin, 2017). AI systems could enact such hacks much more efficiently with fabricated truth 'that panders to its audience's ideologies … enough to compel people to join an imagined cause' (ibid., p.60).

Combine big nudging, fake content, a greater understanding of human psychology and its vulnerabilities, and the ability of AI to individualise content: this has the

global tech leaders such as Bill Gates and Elon Musk.

Even if humans remain in control of the intelligent systems we design (as opposed to being influenced and swayed by them), AI technologies threaten to make us vulnerable, alienated and, paradoxically, 'automated masters' of our creations. We risk falling into a state where we lack know-how, and are dependent on algorithmic processes that control our lives and undertake the meaningful work we once did. This 'tragedy of the master' (Coeckelbergh, 2015) has profound implications for power, knowledge and experience. Increasing dependence on AI could ultimately lead to loss of meaning as human work is replaced by robots (Nauman, 2017) and we voluntarily submit, letting algorithms rule our lives (White, 2015).

Security and existential risks
The US Intelligence Community outlines the risks of AI in a 2017 report (Coats, 2017). These include the vulnerability of AI systems to cyber attack, and advances in foreign weapon and intelligence systems (in particular, autonomous weapon systems). Autonomous weapon systems could be made extremely difficult to 'turn off' to evade enemy interference, but this could make them inherently dangerous.

Some of the risks of AI seem to be genuinely existential (Bostrom, 2014; Chalmers, 2010; Danaher, 2015). These are particularly concerning given that AI research and development might be faster than expected and catch policymakers off guard as we face systems we do not understand. Existential risk from AI could be possible in one of several scenarios: first, if AI is programmed to do something devastating; second, if AI chooses a destructive or perverse method to pursue benevolent goals (Bostrom, 2014). In either case, very competent AI would pursue goals that are misaligned to those of humans.

Alternatively, AI could pose an existential threat by doing something accidental or unexpected (think firing nuclear weapons without a human-like grasp of the consequences, or devising a potent biological pathogen without knowing it will infect humans). AI systems don't have to be robotic to pose a physical existential threat to humans; there is a lot

that could be controlled and interfered with through an internet connection. These critical systems include power grids, food supply chains and quarantine systems. They could potentially include future geoengineering systems that could, if interfered with, cause ecological havoc.

Pervading the four risks outlined here (and other risks identified elsewhere) are a set of moral and ethical themes, which beg for debate and policy. These themes centre on the locus of power and control (at levels of society and human–AI interaction). There are themes of privacy, freedom and autonomy, liability, regulation and safety, and curtailing malicious intent.

International response to the risks of artificial intelligence
The US government calls for a whole-of-government response to AI, and outlines 23 recommendations to ensure that the long-term consequences of AI are beneficial (NSTC Committee on Technology, 2016). Identified risks, alongside regulatory ones, include inequality, employment disruption, challenges in trying to understand and predict the behaviour of AI systems, and the safety of AI 'when exposed to the full complexity of the human environment' (ibid., p.2).

The US recommends mandatory ethical training of AI practitioners, policy consistent with international humanitarian law, monitoring of milestones in AI development, bilateral talks with foreign governments, and ongoing public engagement.

A UK government report identifies similar risks, and in our opinion a critical risk pertaining to advice from AI:

If [humans] question the advice they receive, however, they may be thought reckless, more so if events show their decision to be poor … departments will need to be transparent about the role played by artificial intelligence in their decisions. (Government Office for Science, 2015, p.10)

Some of the solutions proposed in the UK report are local (such as certification for AI engineers) and so may not address global risks in a connected digital world. The UK government also has a Data Science Ethics Framework (UK Cabinet

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Office, 2016) which goes some way to guiding public sector data use, but we need regulation around the private sector too. A Royal Society report identifies 'social issues', 'implications for data use' and 'security and control' as issues (Royal Society, 2017); but it contains little actual detail of what these risks entail.

The Canadian government has initiated a $125 million Pan Canadian AI Strategy aimed at making Canada a world leader in AI and attracting top talent (Canadian Institute for Advanced Research, 2017). Google, Amazon, Facebook, IBM and Microsoft have created the Partnership on Artificial Intelligence to Benefit People and Society to conduct research, including on ethics and fairness (Hern, 2016). IBM identifies issues of safety, control and trust, and that a fact-based dialogue is needed to inform progressive social and economic policy (IBM, 2016). Elon Musk is funding open AI to advance digital intelligence in a way that is most likely to benefit humanity as a whole. The Future of Life Institute has published an open letter regarding the safe development of AI and a list of research

priorities to ensure that AI is beneficial (Russell, Dewey and Tegmark, 2016).

A collective of European academics has recently published an opinion piece in *Scientific American* offering warnings about some of the most insidious risks of AI (Helbing et al., 2017). Their views are critical warnings about change in the nature of society and human reality. The European Union (EU) has taken official steps towards implementing civil law rules on robotics and requirements to register advanced robots (European Parliament, 2017). Also, the EU's new General Data Protection Regulation effectively creates a 'right to explanation', whereby a user can ask for an explanation

allocation (all people are exposed to the risks of AI so there must be resource shuffling to recognise risk externalities and the need for justice, given that we are behind a veil of ignorance regarding a post-AI world);
· population (we must consider how to treat AI systems and what kinds of new entities to bring into existence); and
· context transformation (responsibility and wisdom are needed in a radically unfamiliar environment).

By 'governance' the authors refer not only to the actions of states but also to transnational governance.

report calls for a high-level working group to research these issues, and for a whole-of-government and whole-of-nation approach. We agree with these calls to action. These are necessary – but not sufficient – responses to the risks posed by AI. The New Zealand government needs to see AI as a wider issue than merely an instrumental tool for increasing GDP, and needs to be transparent in communicating the changes AI poses for society.

The Ministry of Business, Innovation and Employment writes that we ought to 'accelerate the safe adoption of AI technologies' (Ministry of Business, Innovation and Employment, 2017, p.7). It favours collaboration between the government, Callaghan Innovation and industry, and supports the AI Forum – yet nascent – to undertake research into AI to identify opportunities and mitigate risks. The AI Forum has an agenda for open discussion around policy and awareness of AI, the economy, and capability and skills needs. It also aims to balance the conversation by providing evidenced arguments against AI doomsayers. The forum's first research project is a stocktake of issues around the economy, society, education and government. This includes New Zealand's readiness for AI, the direct and indirect impacts, skills needed and government opportunities. The AI Forum looks set to provide important information for the government to consider in policymaking. More of this sort of activity focused on the New Zealand context is needed – the sooner the better.

> The New Zealand Law Foundation … is funding a $400,000 University of Otago project which aims to explore the possible implications of AI innovations for law and public policy in New Zealand.

of an algorithmic decision that was made about them. This will drive global standards for anyone who wants to deploy their AI products in the EU (Goodman and Flaxman, 2016).

It is somewhat surprising that policy documents produced by governments pay little attention to the outputs of organisations such as the Centre for Public Impact, the AI Initiative of the Future Society at Harvard Kennedy School, the Future of Humanity Institute at Oxford University, and others. Many of these academics concur that we need some form of global governance board (Bostrom, Dafoe and Flynn, 2016). Given the risks, the transition to machine superintelligence requires a set of 'policy desiderata', these authors argue. Policymakers must pay attention to:
· efficiency (providing technological opportunity, mitigating AI risk and ensuring global stabilisation, e.g. through the use of a single AI governance body);

What has been the response to AI risks in New Zealand?
We argue that in comparison with the response of some nations, New Zealand lacks a governmental response. We also argue that the global response yet lacks the coordination required to deal with truly global risks.

The New Zealand Institute of Directors, noting the lack of dialogue about AI in New Zealand policy, published a horizon scan of AI in New Zealand (Chapman Tripp, 2016). This report surveys the opportunities and risks and identifies potential inequality, unemployment, and legal and regulatory needs. However, there is little discussion of the threat to freedoms and autonomy, to social power, of the risk of autonomous weapons, or the many other potential risks of AI.

The Institute of Directors' report poses two critical questions: what ethical challenges does widespread use of AI raise?, and what controls and limitations should be placed on AI technology? The

These sentiments were reinforced in the 2017 Royal Society of New Zealand's regional lecture series, where Professor Alistair Knott spoke of employment issues, machine bias, transparency, accountability and ethics. He argues that interdisciplinary structures are required, which would include AI researchers, AI companies, economists, lawyers, social scientists and ethicists (AI Forum New Zealand, 2017b). The New Zealand Law Foundation, an independent charitable trust, is funding a $400,000 University of Otago project which aims to explore the possible implications of AI innovations for law and public policy in New Zealand. The study is a collaboration between the

Faculty of Law and the departments of Philosophy and Computer Science.

However, the New Zealand government remains strikingly upbeat about AI and articulates few risks. Coupled with Ministry of Business, Innovation and Employment's strategy that we ought to promote New Zealand as a test bed for emerging technologies, this is concerning. We don't yet know whether a fully informed New Zealand public would concur with this position.

More is needed and more global coordination
We need to create national and global norms surrounding AI. We need to ensure that current regulation around data access, use, privacy and consent are robust at international level. These are truly global issues, and regulating within borders will not prevent abuse across borders. AI is an opportunity for us to revisit inequality and justice on a global scale.

Key existing policy recommendations include, but are not limited to, the following:
· monitor AI development milestones to aid prediction;
· devise mechanisms to ensure fairness of benefit distribution;
· support informational self-determination and popular participation;
· improve transparency and remove 'information pollution';
· improve collaboration at national and global levels;
· promote responsible behaviour through digital literacy and digital ethics. (Bostrom et al., 2016; Helbing et al., 2017; NSTC Committee on Technology, 2016)

Given the risks, policy development is critical so that we don't throw away advances in democracy and human rights by succumbing to insidiously anti-democratic risks like persuasive computing.

Workers and other ordinary citizens must be engaged or decisions will be made for them by people who care more about personal interests. We may need to move toward more collective notions of responsibility, and this needs to have the means and scope to include non-human actions (White, 2015). A global response is needed (Lee, 2017).

What New Zealand might do
The arrival of AI is a collective choice problem at a national and global level. It is not simply a matter of ensuring that New Zealand stays 'ahead', as the Institute of Directors white paper argues. The issue of AI bears much in common with climate change. The New Zealand government and private and public organisations need to focus on the relationship between AI and core values. More ventures like the AI Forum are needed, along with extensive public engagement.

If we agree that '[i]t is totally unacceptable … to use these technologies to incapacitate the citizen' (Helbing et al., 2017, p.15), then we need to negotiate a new social contract, with a policy

… for what world of affordances do we want to be held accountable?

framework which sees citizens as partners and protects the right of people to clean information, to allow them to lead the truthfully informed, self-determined lives critical to a functioning democracy.

Key questions that require a local answer include:
· Do our present legal tools provide suitable options for dealing with the issues posed by AI?
· Ought the world to permit autonomous weapon systems?
· Ought we to permit individually targeted persuasion systems that threaten to undermine a truthfully informed public?
· What are the limits of nudging in the public interest, and the permissibility of nudging for private interests?
· Is a universal basic income one of the solutions to the potential for dramatic inequality?
· Are there emerging tools which might offer solutions to some of the threats posed by AI?

Given the above, we suggest that New Zealand policymakers ought to pursue the following five actions:

Research the risks and impact of AI: Government should fund research and reports on AI that include the ethical/philosophical/social and psychological issues; fund engagement with the public and a societal discourse; and ensure mechanisms so that the findings of studies such as Otago University's can inform policy. 'Funding could come from the government's $410m Strategic Science Investment Fund' (Ministry of of Business, Innovation and Employment, 2016).
Inform and engage the public: The government has a responsibility to digest the outputs of research initiatives such as Google Brain, OpenAI, the Machine Intelligence Research Institute and the Future of Humanity Institute, and a range of academic publications, and translate these so that the New Zealand public remains informed. Embedding a programme of digital ethics within the New Zealand educational curriculum is another option.
Produce clear recommendations: Existing policy needs to be analysed, international policy co-opted as appropriate, and new policy around the legitimate and low-risk use of AI developed. Policy needs to cover risks of: bias and injustice, dominance of media discourse, autonomy, economic chaos and security.
Take a global lead: The government support the formation of a single global body on AI similar to the Intergovernmental Panel of Climate Change, or an 'AI Club' as suggested by Nordhaus for addressing climate change (Nordhaus, 2015). It should advocate for social justice and equity on the global stage; and advocate for ethics around AI and protection of rights, privacy and safety, so we are not forced to follow the lead of others.

Maintain a vision for New Zealand: We must maintain a vision of New Zealand as a society of equality, empowerment and autonomy, with rights to truthful information, where we are protected from weapons of mass destruction. These are non-partisan issues.

We must prepare for a qualitatively different kind of society and move on from present thinking. The critical question is, 'for what world of affordances do we want to be held accountable?' (White, 2015). Issues of foreseeability and negligence must be central to these discussions. AI is a problem space where ideologically diverse parties must come together over ethical issues, and New Zealand has a history as a flexible legislator and innovator in the space of social protection (for example, the Accident Compensation Corporation).

Conclusion

The risks of AI range from comparatively minor issues of privacy and liability, through major societal and economic issues, to issues of existential risk. In general, the lack of detail on risk in government reports proffers a false sense of security and of the absence of fundamental risks to society. This appears to be especially the case in the limited New Zealand policy material on AI produced so far. One important reason that this is concerning is the fact that governments are not immune from causing accidental, or indeed intended, harm. Many of the examples we have presented focus on threats from the private sector, but governments can be just as capable of AI-driven 'Big Brother' social control as private entities.

None of the responses to the risks of AI we have seen fully addresses the problem of profound social change (relating to autonomy, vulnerability, disconnection from decision processes and the ethics of manipulation), let alone existential issues.

New Zealand punches above its weight on global issues and has been a world leader on women's suffrage, nuclear policy and addressing colonial injustice. New Zealand can encourage and work with other countries to move in the right direction, but we need to decide collectively what that direction looks like. This article is not the place for reaching normative conclusions, but these questions need New Zealand answers. With policy decisions being heavily dependent on values and high uncertainty, New Zealand can act as a global honest broker for forging international policy solutions.

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School of Government
Te Kura Kāwantanga

Forthcoming Events

Title	Speaker	Date
The Ground Between: Navigating the oil and mining debate in New Zealand	**Sefton Darby** In association with Bridget Williams Books	**Friday 17th November** 12:30 – 1:30pm Old Government Building, lecture theatre 3, 55 Lambton Quay **RSVP:** maggy.hope@vuw.ac.nz
Putting leadership in its place	Inaugural lecture by Professor of Public and Community Leadership, **Brad Jackson**	**Tuesday 21st November** Lecture at 6pm. Rutherford House lecture theatre 2, 23 Lambton Quay, Wellington **RSVP:** Please phone 04 463 7458

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Toby Moore

Income Volatility in New Zealand

'Economic risk is a lot like a hurricane. Hurricanes strike powerfully and suddenly. They rip apart what they touch; property, landscape and lives … And although they can be prepared for, they cannot be prevented.' These sentiments, from Yale political scientist Jacob Hacker, explain why economic risk is a concern for households, and why the extent of that concern depends a great deal on how well households are protected against risk. The potential for individual bad luck to lead to hardship has meant that society has, in many instances, determined that individual risk should be borne collectively through systems of social welfare or social insurance (Hacker, 2008, p.5).

It is useful to remind ourselves of this fact, because much public discussion of economic security has a distinctly static quality to it. Inequality, poverty and hardship are often debated as if the involved parties were frozen in position, like figures on a complex and occasionally cruel carousel. This tendency towards treating social classes as relatively fixed means that social welfare can come to be seen as based more in charity than in reciprocal obligations and risk sharing.

Though the redistributive role of government is important, there is a risk that, in Nicholas Barr's analogy, the 'Robin Hood' aspect of the welfare state is emphasised at the expense of its role as the collective 'Piggy Bank' (Barr, 2001).

The state's role in contributing to the smooth life trajectories of its citizens is not limited to welfare payments. The state also shapes the institutional setting in which individuals and households operate. It therefore has some hand in

shaping individual incentives and levels of human capital, their exposure to shocks of various sorts and their ability to absorb or adapt to such shocks. The question of economic security for New Zealanders is therefore not simply one of social assistance, but of whether the system overall results in buffers of a public and private nature that are adequate for the challenges of the current environment.

This article examines this question through an analysis of the volatility of individual incomes in New Zealand. It begins by explaining the concept of income volatility and its importance as an indicator of economic security. The data, methodology and findings of this analysis will then be explained, followed by a consideration of the limitations of this approach in terms of both measurement and the conclusions that can be drawn. The discussion section will address how this analysis relates to existing work on income mobility, examine other evidence that might contextualise the findings and suggest areas for future research.

Measuring volatility in incomes
Income volatility is the variance in personal incomes over time. The international literature on income volatility is substantial and growing, and mostly focused on year-to-year volatility, though there is a smaller body of work

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considering volatility over a shorter time frame. As part of the 2017 'state of the state' report, *Fit for the Future: boosting resilience in the face of uncertainty*, Deloitte and Victoria University of Wellington constructed an index of income volatility for New Zealanders between 2001 and 2014. This is the first study to construct a year-by-year index for New Zealand, though other studies have addressed the question indirectly (e.g., Carter, Mok and Le, 2014).

Measuring income volatility can provide some insight into both the frequency and the impact of the shocks faced by individuals, as well as the effectiveness of government transfers in offsetting economic loss. Disruption to income can be of a direct nature: for instance, a worker being made redundant; or more indirect, such as a serious health problem that prevents someone from working. Taking a broad view of the likelihood of individual income loss does not tell us what the cause of that loss is. Nonetheless, it is useful to look at the level and trend of income volatility, if only because macroeconomic trends may not tell us the full story of what is happening at the micro level, and averages can often disguise changes in distribution.

When assessing the social and economic context in which households operate, there is a tendency to resort to broad narrative accounts such as 'globalisation', 'the great moderation' or 'the great recession'. (More recent examples would include 'secular stagnation', 'the rise of the robots' and 'the new normal'.) However, it is not immediately clear that such terms accurately reflect the experiences at the household level (Dynan, Elmendorf and Sichel, 2012). 'The great moderation' was the term used to describe the reduced volatility of key macroeconomic indicators in the United States in the decades prior to the global financial crisis (Stock and Watson, 2002); yet this was also a period of increasing volatility of household incomes, according a number of US studies (Hacker and Jacobs, 2008; Gottschalk and Moffitt, 2009).

Much has been written about why low incomes are a problem for the families that must live off them. If volatility also results in low or inadequate incomes, then the social, psychological and health- or education-related consequences associated with poverty will be of relevance (Boston and Chapple, 2014). However, downward shifts in income are important for additional reasons, beyond the possibility of falling into poverty. Greater variability in incomes makes it much harder for households to plan for the future; to be able to make major investment, educational or lifestyle decisions with reasonable confidence that they will still be in a position to manage these in the years to come. An income loss may be unanticipated, and one that households are ill-prepared for. This may force them to cut back on consumption,

deplete what savings they have or resort to borrowing.

Furthermore, when households are faced with falls in their income, changes within the basket of goods and services consumed by households become very important. Though we are living through a period of low inflation, there has been a noticeable divergence in the relative costs of necessities and luxuries. Education, health, rental accommodation and homeownership costs[1] have all increased at a faster rate than the Consumers Price Index (CPI) overall since 2006 (Deloitte and Victoria University of Wellington, 2017). At the same time, the CPI has been held down by the falling price of imported manufactured goods, such as computing and cell phone technology. When incomes are rising faster than prices, this may not be a great concern. However, it does affect the balance of discretionary and non-discretionary spending in the household budget, and therefore whether households need to respond to a shortfall in income

by cutting back on something more fundamental than fine foods or holidays.

Finally, income volatility measures provide us with an indirect look at the extent to which the welfare system is redistributing across the life cycle. As noted by Hills (2015), the variance of living standards at different stages of people's lives was a core rationale for the creation of the welfare state. In 1899 Seebohm Rowntree identified the 'five alternating periods of want and comparative plenty', based around the presence of children in the household and the individual commencing, and retirement from, their working life. In the model proposed by William Beveridge in 1942, the effective transfer of resources

> … income volatility measures provide us with an indirect look at the extent to which the welfare system is redistributing across the life cycle.

over time could help to smooth out the periods of want by providing child allowances to those with additional mouths to feed and pensions to those in retirement. The same logic applied to misfortune which might intermittently threaten the livelihood of individuals and their families, principally periods of unemployment and ill health that impair one's ability to work.

In practice, there are areas where private insurance deals with risk relatively effectively, particularly regarding the protection of assets (e.g. home, car and contents). On the other hand, dealing with risk associated with future earnings seems to pose additional problems for markets. These problems include moral hazard, imperfect information and adverse selection. The fact that a private consumer is in fact generally not well informed about how long they will live, or their future chances of unemployment, means that risk in these areas has tended to be managed through direct state involvement, or at the very least a

Table 1: Absolute and proportional income impact of a two-income decile fall (2014 data)

Decile	midpoint	two-decile loss	percentage loss
1	[under $6,940]		
2	$10,210		
3	$14,805		
4	$18,245	$8,035	44%
5	$23,395	$8,590	37%
6	$31,655	$13,410	42%
7	$42,050	$18,655	44%
8	$53,595	$21,940	41%
9	$70,160	$28,110	40%
10	[over $80,350]		

considerable state role in regulating private markets (Barr, 2001).

Measuring income volatility can give us a better idea of how the risk-sharing function of the welfare system is operating, in terms of providing assistance in times of need. But perhaps more importantly, it provides a measure of the extent to which economic loss is an inevitability for some part of the population at any given time. Social assistance, on this account, should be understood not so much as redistribution between static groups in society, but rather as redistribution across people's own lives, from good times to bad (Hills, 2015, p.52).

Data and methodology

To get an idea of the degree of volatility of New Zealanders' incomes, we looked at the share of the working-age population who fell two or more income deciles from one year to the next between 2000 and 2014, based on Statistics New Zealand's linked employer–employee data (LEED). By way of example, this would be someone in the top 10% of income earners one year whose income fell to somewhere in the bottom 80% in the second year, or someone in the fifth decile (between the 40% and 50% points of the income distribution) who fell into the bottom three deciles (the lowest 30%). This analysis is at the individual, rather than household, level.

Table 1 shows how big an income loss a two-decile drop equates to. Taking the midpoints of each income decile,[2] a two-decile drop represents a loss of around 40% of an individual's income. Though this proportion varies somewhat, such a loss represents a substantial hit to household incomes. For obvious reasons,

for those towards the lower end of the income distribution such a loss would have much greater repercussions in terms of meeting basic human needs. It should also be emphasised that this level of income loss is the minimum of what we are measuring. Some individuals will have fallen further than two deciles, and thus experienced an even more severe loss of income.

The reason for confining the analysis to drops of at least two deciles is to remove some of the 'noise' that we might see by including those who have dropped one decile. This group might include people who were just above the bottom limit for an income threshold in one year, and have fallen into a lower bracket in the following year due to a small drop in income, or by being overtaken by increases in the bottom limit for their previous bracket. This has the effect of dampening the degree of measured volatility, but we would otherwise have no easy way of determining whether what we are measuring actually corresponds with a meaningful shock to individual incomes.

This approach also means that we do not capture downward shifts in income for people in deciles 1 and 2, who do not have two deciles below them. For the sake of clarity, the exclusion of these deciles relates to the first year of the income transition measurement, meaning those falling *from* a decile to a lower one. The analysis does include individuals who fell *into* deciles 1 and 2 in the second year of the measurement (assuming that fall was of two deciles or more).

Confining our analysis to New Zealanders between the ages of 20 and 64 means that the picture is not complicated

by people whose incomes fall due to retirement at age 65 or over, when they are entitled to New Zealand Superannuation. Individuals who were classified as 'absent' in the data set (i.e., not recording any income at all) for either the current year, or previous year, for any of the year-to-year movements are not counted in this analysis. This therefore excludes people who have died, or left the country between one year and the next.

LEED includes data on New Zealanders' income from wages, self-employment and most government transfers, including income-tested benefits, student allowances, paid parental leave, New Zealand Superannuation and ACC. It does not include income from investments, government transfers that are not taxable (such as childcare payments, the accommodation supplement and disability allowances) or tax transfer payments by Inland Revenue or Work and Income New Zealand. This latter category includes the Working for Families tax credits, which are payments structured around the entitlement of families rather than individuals. As the data is based on tax information, we cannot account for undeclared income.

The coverage of LEED beyond just market income means we are capturing not only the initial hit to an individual's income, but also the effectiveness of the social welfare system in offsetting that loss. It is, however, notable that as LEED includes ACC payments, and the percentages of income that equate to a two-decile drop in Table 1 are all well over 20%, ACC's model of compensating for up to 80% of pre-injury income (up to a capped sum) should exclude all but the top decile from the share of New Zealanders suffering a two-decile fall.

This picture may change slightly if we were able to account for all social transfers, including those detailed above not included in LEED. However, it is important to understand that some transfers are not designed as automatic stabilisers. Their effectiveness as a buffer against income loss is therefore questionable. For instance, a number of payments under the Working for Families tax credits have a paid work requirement of 20 hours per week for a single parent,

or a combined 30 hours per week for couples. This means that falling below the required working hours would also effect a household's entitlement to this assistance. In some circumstances the loss of entitlement to a work-related tax credit would be offset (partially or wholly) by an increased entitlement to the means-tested family tax credit. However, there may be situations in which a small decrease in the hours worked within a family leads to a change in Working for Families entitlement that actually amplifies the loss of household income, due to the steep 'cliff' associated with the strict work requirements of the in-work tax credit and minimum family tax credit.

Findings

Figure 1 shows that close to one in nine working-age New Zealanders will suffer a significant fall in income in any given year. The volatility of incomes follows the business cycle, peaking in 2009 at approximately 12.5% and declining steadily thereafter. Despite this broad replication of overall economic conditions, it is notable that volatility was rising from 2005 onwards, prior to the onset of the global financial crisis.

There has not been a trend of increased volatility over the period measured. The volatility of the most recent years measured is in fact lower than that of any year during the decade beginning in 2001. In terms of total numbers of individuals, the average number of New Zealanders seeing this degree of income loss between 2001 and 2014 is over 214,000 each year.

We are also able to examine where this aggregate level of volatility is concentrated in the income distribution. As Figure 2 shows, deciles 4–6, or those receiving between $15,720 and $35,550 in 2014, have a notably higher level of volatility than the higher income deciles.[3] For this group, the year-on-year risk of a substantial income drop is generally between 15% and 17%, or somewhere between a one-in-six and one-in-seven chance.

The volatility of incomes in this lower income group has also been slower to subside in the wake of the global financial crisis than that of the measured population as a whole. Figure 3 shows the difference

Figure 1: Proportion suffering a fall of two income deciles or more, individuals aged 20–64 years in deciles 3–10
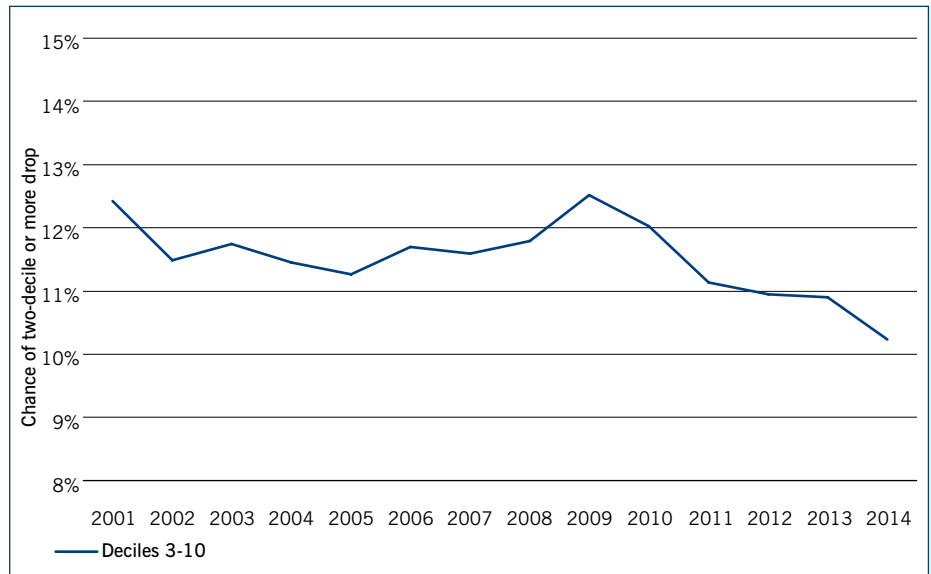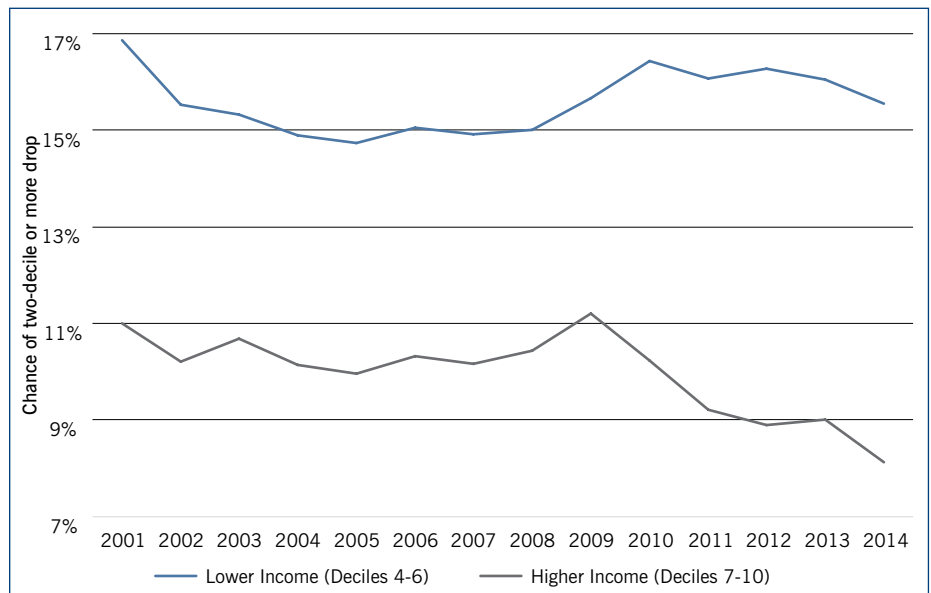

Figure 2: Comparison of levels of income volatility – lower income vs higher income individuals, aged 20–64 years

in risk between the higher and lower income groups set out in Figure 2, and displays a clear trend towards an increasing gap between the two. The additional risk experienced by lower income groups has increased from somewhere below 5% from 2003 to 2009, to above 7% in the more recent years measured. This is due primarily to a falling level of risk among higher income groups, rather than risk at the lower end of the income distribution increasing in absolute terms.

Income volatility by gender and age
The international literature tends to find that females have higher volatility of incomes than males (Dynan, Elmendorf

and Sichel, 2012). The New Zealand data, seen in Figure 4, shows the same pattern. The volatility of female incomes is typically around one percentage point higher. Male incomes also seem to be more sensitive to the business cycle than female incomes. The volatility of male incomes rose more quickly with the onset of the global financial crisis (and is higher than for female incomes in 2010), and also subsided more quickly as economic conditions improved.

This picture changes considerably when we look at the volatility of males and females in different income groups (Figure 5). Dividing our eight-decile population into a lower income group (deciles 3–6)

Figure 3: Difference in levels of volatility faced by higher and lower income groups in Figure 2
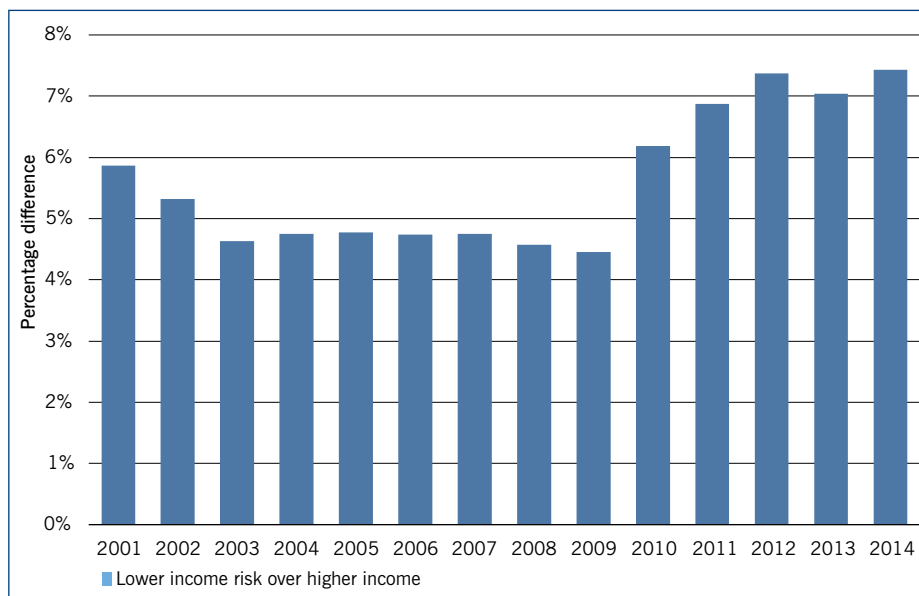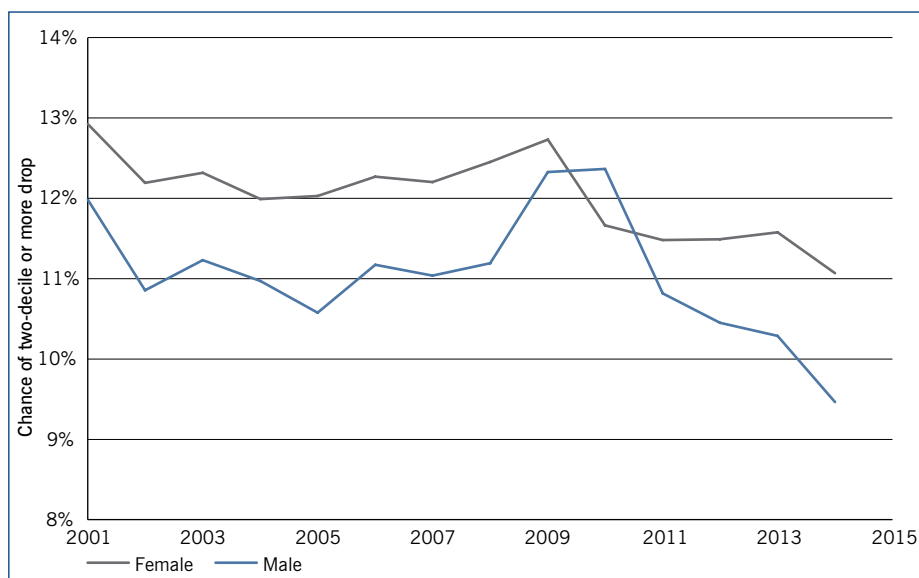

Figure 4: Comparison of male and female volatility, deciles 3–10, aged 20–64 years

and a higher income group (deciles 7–10), we see that there is a significant divergence within the male population. While female income volatility is relatively similar between the higher and lower income groups (and both are higher than for the general population in Figure 1), the lower than average volatility of males overall obscures the fact that low-income males have very high volatility of income relatively speaking. It is the very stable incomes of high-income males that drags the aggregate level below that of females.

Figure 6 shows the distribution of volatility by age. Over the period between 2001 and 2014 financial risk was experienced in an uneven U-shape between young and old. The overall

distribution shows much greater volatility of income for younger age groups. The rate does rise from age 50 onwards, as would be expected due to people choosing to retire, though redundancies and health-related withdrawals from work can pose difficult challenges for people at this stage of their lives also. The volatility of incomes for those aged 65 and over is included here for comparison, and is considerably lower than that for any other age group.

Limitations

There are a number of limitations to this approach, which can be roughly grouped under two headings: those that likely overstate the degree of individual income volatility or its actual impact

on households, and those that likely understate it.

Factors overstating volatility (or its impact)
Dealing first of all with the former, there are some key qualifiers to treating this measure of income volatility as a direct proxy for economic risk or insecurity. The most obvious is that we cannot easily distinguish involuntary falls in income from voluntary ones. To give one example, consider a highly paid management consultant who decides to leave that position to instead teach a meditation class. This person would receive a much lower income (though would presumably be enriched in some other, non-monetary ways). In this analysis, such a person would be counted as suffering an income loss in the same way as someone who is made redundant and is unable to find work, yet naturally the concern we would show for the former situation is nothing like that we would show for the latter. The spiritually-enriched former consultant does not lack for substantial freedoms, following Sen's capabilities approach, in the same way as the out-of-work individual (Sen, 1999).

The more common instances of voluntary income loss are likely to be those relating to work/life balance and changing careers. This includes those who reduce their involvement in paid work to undertake study or training, or to care for children, elderly parents or relatives with disabilities. However, all such decisions are made in circumstances that are beyond our own control to some degree, and there are clearly instances where such situations should not be understood as being fully voluntary. This includes someone choosing to retrain because they anticipate fewer job opportunities in their current industry, or those who have people close to them in need of their ongoing assistance.

Nonetheless, it is important to note that an income loss which is regarded as voluntary might still be a matter of social concern. Retraining and parental leave are inevitable occurrences in society, and it is a matter of societal priorities as to whether more should be done to counterbalance the income loss that typically accompanies these situations.

There are further factors to take into account that might overstate the impact of income volatility. As our data is individual, it does not take into account the picture at the household level, which is more important when it comes to the well-being of those who are part of a resource-sharing economic unit. Specifically, if a loss of income suffered by one individual leads to another income earner within the household increasing their work hours, then any impact on household consumption is likely to be offset to some degree.

Unlike many international studies, this data is longitudinal only in a short-term sense. We are observing in essence a large number of two-year snapshots over the 14 years of available data, and so cannot assess whether a fall in income from year one to year two is followed by a bounce back of some sort in year three.

Furthermore, before making any judgements on whether an observed income loss leads to a decrease in household consumption, we ought to consider what options are available to households to 'smooth' deviations in income. For instance, households could (in some combination) resort to savings or draw upon other assets, borrow to cover a shortfall, or they may have access to insurance. This is discussed in greater detail below.

Factors understating volatility
Although we do not see a clear secular trend in income volatility over the period of 2001 to 2014, both the level of volatility and its concentration among income groups and between genders presents an interesting picture. There are a number of limitations to this analysis which might understate the level of income volatility among New Zealanders.

Focusing on downward movement between income deciles, and excluding shifts of only one decile, means that this analysis excludes deciles 1 and 2. This approach means that we do not capture falls in income experienced by the bottom 20% of income earners, who do not have two income deciles below them, but for whom any significant decrease in income would be a considerable shock. The overall volatility of incomes in New

Figure 5: Comparisons of male and female volatility by income groups, deciles 3–6 and 7–10, aged 20–64 years
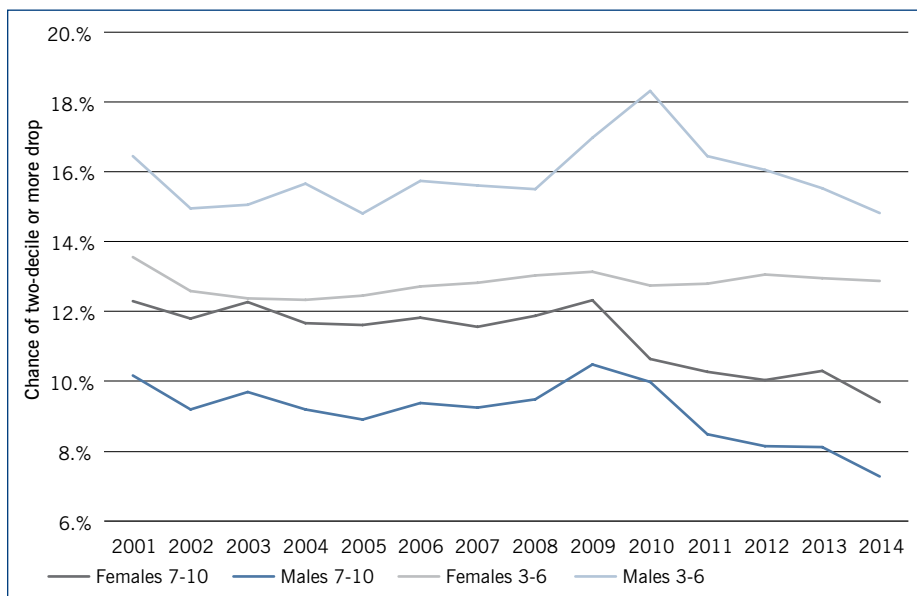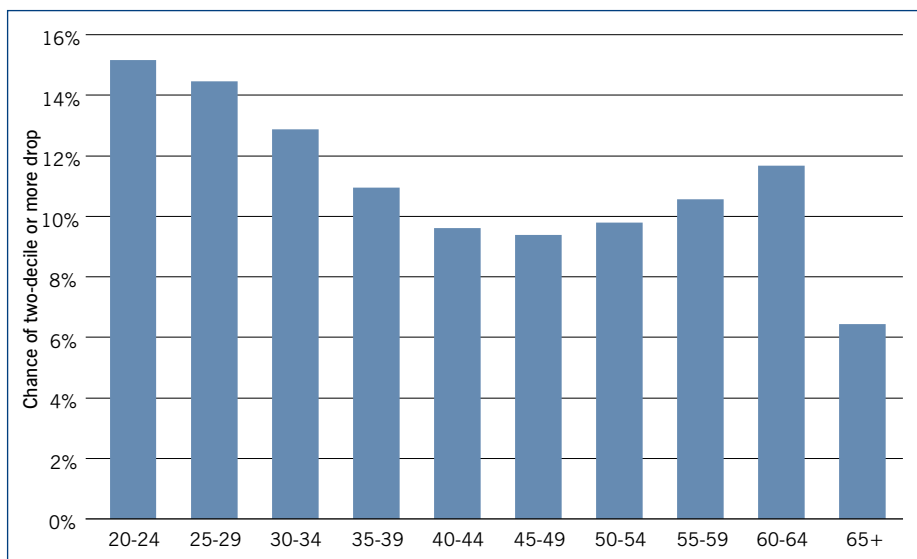

Figure 6: Average income volatility by age group, 2001–2014

Zealand is also understated by not including absolute decreases in income that do not result in someone changing income brackets. For instance, someone at the top end of decile 5 could suffer a fall in income of $5,000, but still remain in the same decile bracket.

It should also be noted that this analysis, along with most international studies, is focused on inter-year volatility. A growing international literature is focused on intra-year volatility, most typically through measuring variances in month-to-month incomes (Bania and Leete, 2009; Hills, 2015). This is often closely associated with the 'gig economy', which involves non-traditional employment around short-term tasks,

projects or relationships with clients, and often utilises online platforms (Bughin and Mischke, 2016).

Month-to-month volatility poses a different set of challenges to a substantial shock to income from one year to the next, which might be associated with a period of unemployment or serious illness. A single major shock might be smoothed out through drawing upon savings for those fortunate enough to have them (for a transitory shock), or require a challenging but manageable adjustment in lifestyle (for a permanent shock). However, month-to-month variations in income require a constant process of budgeting, exhausting and restoring financial buffers and the greater

likelihood of an ongoing reliance on debt, possibly at high interest rates. Informal assistance from friends and family members is another source of buffers for unstable short-term incomes, though not everyone has this option available.

Furthermore, an individual living off an income that is both low and variable is likely to face an ever-shifting entitlement to social assistance. This is important, first of all, because some entitlements require that workers are in a job for a certain period of time before they are available (i.e. sick leave, parental leave). Having an adequate knowledge of one's entitlement to assistance, and the time and complexity associated with claiming it, can also pose

connected to it in a number of ways. The rising or increased levels of income inequality in many advanced economies over recent decades has led to concerns about intergenerational mobility: that is, whether the concentration of rewards at the top of the income distribution is leading to the development of more rigid social classes, where one's chances in life are more closely tied to the socio-economic position of one's parents. In this context, income mobility is often seen as an indicator of equality of opportunity, though this is less true of (short-term) measures of intra-generational mobility than longer-term intergenerational studies (Corak, 2013).

misfortune. Yet it is important to bear in mind that upward relative movements between income deciles is the necessary corollary of downward shifts. In a similar sense, the work presented here on income volatility demonstrates that what is often presented as a positive story of income mobility also includes a significant level of downward shifts in income in *absolute* terms, not simply relative shifts.

This underscores an important point: a society marked by highly unstable incomes is likely to appear as a reasonably mobile society over the shorter run; however, over the longer run it is plausible that a society that does not deal with individual risk in an effective way will see initial disparities in life chances reinforced. As John Hills has detailed, the advantages of being born to affluent parents are not limited to the early years of life, but are reinforced throughout the life cycle, in the form of assistance with higher education, help with housing costs or the deposit for a house purchase, inheritance and other intra-family transfers of wealth (Hills, 2015). All things being equal, these advantages are likely to mean that their beneficiaries will deal with economic risk much better than those without such advantages – a proposition which is consistent with the higher concentration of income volatility among the lower-middle class.

> … income mobility is seen as offering a more nuanced understanding of the distribution of income in society than a static picture of the shares that different groups receive at a certain point in time.

considerable barriers for some people. In September 2017, TV3's *The Nation* reported that, according an Official Information Act request, difficulties around claiming benefits meant that approximately $200 million each year was not received by families who were entitled to receive it.[4]

Discussion

There are two main areas arising out of this analysis that this article shall address. The first is to explore the position of income volatility in relation to the more well-established work on income mobility. The second is to put these findings in a broader context of economic and social trends, and offer some tentative answers as to why income volatility in New Zealand looks the way it does.

Income mobility – the relative or absolute movements in an individual's income over time – has become a topic of considerable academic interest in recent years. This has been parallel to work on income and wealth inequality, and

At the same time, income mobility is seen as offering a more nuanced understanding of the distribution of income in society than a static picture of the shares that different groups receive at a certain point in time. To put it another way, the level of income inequality over one's lifetime is likely to be less than at a single point in time. The argument here is that the implications of a less equal distribution of income might be different depending on the degree to which there is movement between income groups over time (Barker, 1996). For instance, a New Zealand Treasury paper notes that 'There is change in incomes between one year and the next, with over 60 percent of the population changing income decile group ... Only 22 percent stay in the same income decile group eight years later' (Carter, Mok and Le, 2014).

In some sense, income volatility presents the flip side of this story. At the superficial level of mental images, the level of income volatility discussed here may naturally evoke a picture of loss and

As noted, downward shifts between income deciles must by necessity coincide with upward shifts by others in society. This raises the issue of the extent to which we can weigh these prospects against one another. It could be argued that individuals are to some degree compensated for the greater risk of downward shifts by the corresponding chance of upward movement.[5] For instance, Carter, Mok and Le (2014) found that in 2002 New Zealanders had an equal chance (6%) of their income increasing or decreasing by $20,000 or more in the following year.

It makes sense to take this offsetting upward mobility into account; however, there is good reason to view the risk of downward movements as a serious concern, notwithstanding any corresponding chance of upward movements in the same year. The first is people's tendency to experience loss

aversion, meaning that people tend to value avoiding a fall in their position more than they value an equivalent increase (Kahneman and Tversky, 1979). If we consider subjective well-being to be an objective of public policy, then this would tend to favour a lower volatility system.

The second reason is that it is unquestionably a lot easier to adjust household finances to an increase in income than a decrease. Many of our outgoings represent long-term, fixed commitments (for instance, mortgages and rental accommodation, education-related expenses, childcare), and having to unravel these obligations can be difficult, costly or disruptive to social networks and established relationships. We should also bear in mind the social and psychological costs that might be suffered in the course of this transition, if the end result is that a household experiences a greater degree of material deprivation.

Social and economic context
It may be surprising to some that New Zealand does not exhibit the same observable increase in income volatility that has generally been found in other advanced countries. However, a number of points should be borne in mind. First, many of these (particularly US) studies find an increase in volatility that predates the scope of this analysis. A number of more recent studies have found a relatively stable trend over the period since 2000 (Hardy and Ziliak, 2014).

Second, labour market changes are often highlighted as a causal factor in trends in income volatility, and though New Zealand has undergone some significant transformations on this front, these also predate the years covered by LEED. One third of New Zealanders are in non-standard employment. However, the growth in part-time work largely took place in the late 1980s and 1990s, and the share of self-employed people has been relatively stable (Statistics New Zealand, 2014).

Third, it is possible that there are different trends for various components of incomes, as found by Jenkins (2011) with regard to data for the United Kingdom. Such divergences may act to offset one another, and disguise any

Table 2: Comparison of loss associated with a two-decile drop vs wealth position by decile

Decile	Two-decile loss	Mean net worth ($)	Mean financial assets ($)	Mean cash in bank ($)
1		-$23,000	$400	$1,200
2		$3,200	$100	$700
3		$12,300	$200	$2,000
4	$8,035	$32,000	$600	$3,100
5	$8,590	$68,700	$1,600	$6,100
6	$13,410	$124,800	$2,700	$7,900
7	$18,655	$193,600	$3,600	$10,700
8	$21,940	$280,600	$6,400	$15,800
9	$28,110	$428,300	$14,400	$25,200
10		$1,289,700	$63,500	$69,100

Wealth data for 2010 from Rashbrooke, Rashbrooke and Molano, 2017 (data tables provided by authors).
Note: calculation of decile midpoints is based on 2014 data.

underlying trend. Further work on disaggregating the components of income would provide greater insight on this point. However, it should be noted that the major welfare change in this era, the Working for Families tax package, is not captured by the data used here.[6]

This analysis provides an ex post view of disruptions to individual incomes. While we are not in a position to directly assess how effectively households can smooth volatility in individual incomes, some tentative comments can be made regarding what is known about options for offsetting income loss.

Rashbrooke, Rashbrooke and Molano (2017) provide evidence from as recently as 2010 on the wealth held by New Zealand households. Table 2 compares these findings with the midpoint income losses represented by a two-income decile fall (as set out in Table 1). Mean net worth is greater than the (minimum) income loss measured in this analysis for each decile, though this wealth is typically concentrated in housing equity. The two right-hand columns show the mean worth of more liquid assets: cash in the bank and financial assets. For deciles 4–7, the income loss is greater than the mean total of liquid assets. For decile 8, it is broadly equal.

Households are, of course, likely to smooth income losses through some combination of budgeting, drawing upon assets and borrowing. However, this comparison provides some context for the extent of the income loss that is measured in this study of income volatility, relative

to the financial buffers that New Zealand households have available to them. The figures for wealth are at a household level, whereas the income volatility data is for individuals.

Partnering and forming a household provides an additional avenue of risk sharing (though obviously that is far from the only reason for doing so). The share of couples with dependent children who are both employed (as opposed to one or neither being employed) has actually risen steadily in recent decades. This rate was below 60% in 2000, and had reached the mid-60s by 2014 (though there has been an even larger increase in the years since 2014, to close to 70%; Statistics New Zealand, n.d.). This means that more households have more than one source of labour market income; however, it may also represent an increasing share of households that need two incomes to get by.

Conclusions and further research
This analysis has provided an indirect and tentative look at the incidence of income-related shocks, and the effectiveness of the institutional system in effectively dealing with this risk. The level, trend and concentration of income loss present an uneven picture. It does not appear that the aggregate level of volatility has increased since 2001. However, lower income groups face much greater chances of a substantial fall in income than higher income groups, but are likely to have fewer financial buffers and less resilience against economic loss. We also see very different

levels of risk between age groups and between genders, as well as within genders once income is taken into account.

There are a good number of areas where further research might add to our understanding of income volatility in New Zealand. Assessing the incidence of economic loss over a longer time period would give a better idea of how policy changes have affected the level of financial risk faced by New Zealanders. Matching up this work with a better understanding of how and when households can smooth their consumption in the face of income loss (and how this varies between different groups) would provide a much better indicator of how this aggregate level of volatility translates to outcomes for individuals and families. This includes intra-family transfers, and the implications of this for intergenerational mobility. And, as noted above, the volatility of inter-year incomes does not give us a good idea of how incomes are fluctuating over a shorter time frame, such as the measures of monthly volatility that are emerging internationally. The impact of changing

work patterns and automation on the stability of household incomes is likely to be a major concern for the future.

Finally, although it is difficult to say what level of volatility ought to be considered acceptable within society, there are certainly patterns in the distribution of financial risk that should be cause for concern. Further work on how policy changes can provide greater economic security to households is therefore important. Individuals and households have diverse aspirations, and different things about their lives that they each hold dear. However, we all have a common interest in making sure that the inevitable incidence of misfortune within society does not unduly determine the course of our lives.

1   Homeownership in the CPI does not include the price of land. It therefore understates the price of homeownership.
2   All figures referring to decile bands are before tax, and refer to 2014 figures.
3   Decile 3, the lowest decile measured through this approach, has conversely very low volatility relative to other lower deciles. It is unclear how much of this is a limitation of the methodology at the bottom end of the income spectrum. For instance, an individual in decile 3 faces the possibility of falling up to two deciles at most, compared to someone in the fifth decile who can fall up to four deciles, and so on. The proportional drop for decile 3 falling to decile 1 would also be much greater than the equivalent fall for higher deciles.
4   http://www.newshub.co.nz/home/election/2017/09/winz-creating-two-classes-of-kiwis-labour.html; http://www.radionz.co.nz/news/election-2017/339064/winz-staff-accused-of-withholding-entitlements.
5   Thanks to Norman Gemmell for this point.
6   Such changes may have had a dynamic effect on other components of individual income, but the evidence on this suggests that this package had a positive impact on employment (Dalgety et al., 2010). Such changes would most likely be related to labour market income, and therefore visible in the data.

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Trends and Determinants of Top Pay in the New Zealand Public and Private Sectors, 1995–2014

Introduction

This article analyses recent trends and determinants of chief executive (CEO) pay in the New Zealand public sector, and of numbers and pay of senior managers in the sector. Comparisons are made with the listed company private sector. It turns out that both CEO pay growth and numbers of senior managers in the public sector have lagged behind those in the private sector, while senior manager pay has moved ahead.

The article complements Hazledine (2016), which was concerned solely with listed private companies over the 1995– 2014 period, and to which the reader is referred for detail on the listed company sector and its data. A longer version of this article is available as Hazledine et al. (2017), and includes an analysis of the apparent broad decline in managerial productivity in New Zealand, with a case study of the University of Auckland.

The first section gives some institutional background to the changing role and remuneration of public sector CEOs in New Zealand over the past three decades. Section two introduces the variables used in the study, and section three analyses the data. Section four concludes by drawing out implications for policy and future research. An Appendix documents the regression models used to explain differences and changes in CEO pay in the New Zealand public and private sectors.

The recent history of public sector chief executive pay-setting in New Zealand

Before the 1984–90 'Rogernomics'[1] neo-liberal policy revolution in New Zealand (Hazledine, 2014), most public sector activities in New Zealand – including the activities of 'trading' entities, such as the Post Office and the Electricity Department – were organised on departmental lines, with each department run by a permanent head or 'secretary' reporting to his (rarely

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– never? – her)[2] central government minister. In the late 1980s this situation was upturned, in particular following the passing of the State-owned Enterprises Act 1987, the State Sector Act 1988 and the Public Finance Act 1989. Bollard et al. (1996) report that, just during 1987–88, 24 government departments were 'corporatised' into state-owned enterprises (SOEs; see Duncan, 1996), and a similar number fully or partly privatised, these all previously having been trading departments, selling products – airport services, electricity, telecommunications, banking, forestry and so on – on the market.

The remaining public sector organisations – which are our primary

foundations of Rogernomics. The basic assumption here was that 'management' is a generic skill, applicable in any organisation or workplace by any smart person with a good knowledge of principal–agent ('agency') theory. For example, generic managers with zero medical expertise could replace senior doctors and nurses in the running of public hospitals, and *should* replace them, because the medical professionals could not be trusted to not exploit their special position (asymmetric knowledge advantages) to further their own private goals.

A corollary of managerialism was this: if public and private sector managers were basically interchangeable, then their

core central government departments, which operate in the 'public service'.[4] For 103 other 'Crown entities', their boards come up each year with a figure for their CEOs' pay, but must then 'consult' with the SSC before implementing these (State Services Commission, 2016). Consultation has teeth in the case of the tertiary education institutes and the district health boards among the Crown entities, whose proposed CEO pay numbers must be 'approved' by the SSC. Other public sector organisations, mainly local authorities and SOEs, do not come under the jurisdiction of the State Services Commission for CEO pay setting or other matters.

In 1997 the government formally abandoned the idea of a strict private/public CEO pay link, explicitly recognising skills required and responsibilities shouldered by public sector managers which are not generic, and which in particular are not part of most private sector CEO job descriptions.[5] The state services commissioner put it in these terms:

> The commissioner tactfully suggests that the public sector's previous participation … justified the … similarity between private and public sector CEO job skills, but this doesn't really make sense.

interest in this article – had imposed on them various quasi-market procedures and constraints: limited-term appointments for CEOs, and annual performance evaluations, with bonuses based on success or not at achieving 'KPIs' – key performance indicators – which intended to match the disciplines supposedly enforced on private sector boards and their CEOs by the market. Many issues are raised by attempts to measure success in providing government services in relatively simple formulaic terms. These are not our concern here, but we note that accountability by means of KPI performance assessment remains central to the monitoring of public sector CEOs in New Zealand.

What has changed somewhat, and is relevant to our prime interest in CEO pay, can be seen as a partial retreat from the full-blown managerialist theory that was one of the most theoretically interesting (even, internationally, unique)

remuneration should be closely linked, and driven by market-determined private sector managerial pay rates, as apparently it was – or was supposed to be – in the wake of the 1988 State Sector Act. But if the linking doctrine was applied it must have been at a sizeable discount. The state services commissioner, in his 1998 annual report, reported that base salaries for CEOs in 'broadly comparable positions' rose by as much as 130% in the nine years to 1997 in the private sector, but by just 42% in the public service (State Services Commission, 1998, p.16). In real terms, adjusting for inflation, this means that private sector CEO pay increased by 81% and public CEO pay by just under 10%.[3]

We need to note here the difference between public service and public sector, and the role of the State Services Commission (SSC), and its own CEO, the commissioner. Currently, as the SSC's 2016 *Senior Pay Report* explains, the commission sets CEO pay for 26 of the 29

> Chief executives who lead departments with policy advice roles[6] must understand the capacity of the State to effect change in social and economic conditions. This usually demands an understanding of social policy or economics disciplines. In the case of some roles, this understanding must be evident in a high level of academic qualification. Several chief executive roles demand substantial professional expertise in, for example, the law, science and technology, or accounting … All chief executive roles demand an understanding of senior management in a public environment, and the responsibilities and accountabilities of that environment. (State Services Commission, 1998, p.15)

The commissioner tactfully suggests that the public sector's previous participation in market-oriented 'trading' activities might, in 1988, have justified the assumption of some strong generic similarity between private and public sector CEO job skills, but this doesn't

really make sense. The retreat of the state from commercial activities via corporatisation and privatisation was well underway by 1988, and well understood to be sweeping in its soon-to-be-completed extent.

The government in 1997 also instructed the SSC to strengthen internal assessment of public service CEOs' performance and the linkage of this to their remuneration. What the government did not tell the SSC how to do was how to set benchmarks for the public service CEO salaries as a whole, given that the administratively useful link – albeit at an increasing discount – with private sector salaries for 'comparable' jobs had been abolished. The commission itself apparently came up with the proposal that was adopted: public service and state entity CEO pay would be 'set against remuneration for chief executives working in the wider public sector', this being mainly the local authorities and state-owned enterprises (State Services Commission, 1998, p.18).

Such remains the situation to date – annual SSC reports right through to 2016 make fairly familiar reading. There is an almost amusing passage in the 2003 annual report. The (same as quoted above) commissioner writes:

> In last year's annual report I drew attention to my increasing influence on State sector remuneration as a result of the Commissioner's expanding role in concurring with, or advising Boards of Crown entities on, the terms and conditions of employment of their chief executives … The process is becoming 'circular'. The more I influence the market, the more it loses its value as a benchmark. (State Services Commission, 2003, pp.12-13)

Indeed. The commissioner was probably right to be worried here, even if he seemed unafraid to run the risk of exaggerating his personal importance in these matters. The 'wider public sector' is, relatively, not very wide. The 2001 New Zealand census reported that total employment in enterprises owned by the central government was 224,000, and in local government 31,400. Switching employees in SOEs from the central to the local government tally (such then being in essence the wider public sector) would not make a big difference to the size discrepancy.[7] There must indeed be considerable 'circularity' or interdependence in the setting of the terms and conditions of employment of public and near-public sector chief executives.

So, can we cut through the circularity and identify exogenous factors determining, or at least significantly influencing, public sector CEO pay? Such is our purpose in this article. As well, we will examine the situation of the highest paid managers reporting to CEOs. Their pay is not set by the State Services Commission, though we could expect some linkage with what 'the boss' gets.

Variables and data

Data on CEOs and numbers of other employees on high salaries

We have in New Zealand what may be uniquely detailed information on top pay. The New Zealand Companies Act 1993 required companies primarily listed on the New Zealand Stock Exchange (now NZX), and required thereby to submit audited annual financial reports in New Zealand, to in future provide information in those reports not just on the total remuneration of their chief executive (which had not been required before, but was often made available), but also on the numbers of employees earning more than $100,000 a year, with these numbers disaggregated into bands of $10,000 – i.e. $100–110,000, and so on. Names and job titles of these employees were not required to be disclosed. The new data began to turn up in annual reports from 1995 onwards.

The situation for public sector organisations in New Zealand is somewhat different, with pay disclosure apparently a policy matter, though influenced by the Companies Act 1993. Some public sector entities do choose to report CEO and pay band data in their annual reports. Others make this information available to the State Services Commission, which in turn does publish all the CEOs' pay in what is now called the *Senior Pay Report*, covering public services departments, district health boards, tertiary education

As for top pay numbers, these are submitted to the SSC in a form 'consistent with the Companies Act 1993', but only reported publicly in two aggregations: all public service entities, and all tertiary institutions.

institutions, and other statutory Crown entities.

As for top pay numbers, these are submitted to the SSC in a form 'consistent with the Companies Act 1993', but only reported publicly in two aggregations: all public service entities, and all tertiary institutions. We have had to write hundreds of Official Information Act requests to the individual entities and institutions, requesting the pay band numbers first for 2014, and then (this done separately) the earliest year available. Responses to our requests have been generally good, though not universal, with the earliest such data being for 1995, but most for various later years.

The $100,000 salary minimum remains in place. However, $100,000 in 1995 is worth almost exactly $150,000 in 2014, after inflating by the Consumers Price Index. Accordingly, to maintain comparability with early years, the top pay cohort analysed is set to begin at a pay of

Table 1: Descriptive Statistics, Public Sector Organisations

(All monetary variables observed before 2014 are inflated to 2014 prices with the consumer price index)	Maximum	Average	Minimum
Total annual budget, $millions	4731.4	362.7	1.2
Remuneration of Chief Executive, $	840,000	378,492	100,000
Total remuneration of all employees earning more than $150,000, excluding CEO, $millions	195.7	13.1	0
Total number of employees earning more than $150,000, excluding CEO	765	61	0
Average annual wage of all other employees, $	151,500	81,970	55,213
Number of all other employees	8908	1343	4

$150,000 in 2014 prices. That is, we do not use all the information on numbers of employees earning over $100,000, except for 1995. Data for intermediate years are pro-rated into higher pay bands according to each year's CPI, as explained in Hazledine (2016).

We will refer to employees earning more than the equivalent of $150,000 in 2014 prices as 'managers', which most of them must be, though outside the core public service sector lie the district health boards and the universities, in which organisations doctors and professors will often or mostly earn more than $150,000.

Factors determining CEO pay
There are a number of factors which might plausibly be proposed as likely to affect the level of remuneration received by the men and women who head our listed companies and public sector organisations: (1) internal/organisational factors; (2) market factors; and (3) performance factors.

Internal/organisational factors
It is reasonable to expect that CEOs with more 'difficult' jobs would get paid more. But how is difficulty to be measured? The reports of the State Services Commission often refer to a concept known as 'job size', of which in 2000 there were five 'bands', measured in something called 'Hay points'. We assembled data for four variables that we thought could be plausibly proposed as components of public sector CEO job size:

· the annual budget of the department or other entity;

· the number of senior managers;
· the average pay of senior managers;
· the number of other employees.

Market factors
To the extent that there is a general market for CEO services, then prices paid for such services in this market can be naturally expected to affect salaries offered to and accepted by our New Zealand public sector CEOs. We have noted above the difficulties in finding plausibly exogenous local benchmarks for public sector top salaries. We note now our belief that, at least for English-speaking executives, the market for such talent, in both private and public sectors, has indeed become 'thicker' because more globalised in recent decades. It would be interesting to have some historical research on the backgrounds of private and public sector CEOs in New Zealand. Our expectation is that, 40 or so years ago, most of these would be both local citizens and internal appointments – career or long-service employees of the firm or department they eventually worked their way to the top of. Now, external candidates sourced from all over the English-speaking world can be found leading our large organisations. We use an annual time trend to at least measure, if not explain, long-term shifts in the CEO market.

Performance factors
In the private sector there are financial metrics for CEO performance, including profitability and, perhaps, total revenues. Public sector entities are not-for-profit and their budgets are politically determined.

We have no data on what is included in public CEOs' key performance indicators.

We ended up with a database on 123 public sector organisations, each observed in 2014 and in one earlier year. The only variable for which we have complete data is CEO pay, and the smallest sample is for numbers of non-managerial employees.

Quantitative analysis
Table 1 gives maximum, average and minimum values for six variables reported by our public sector organisations. All monetary values are converted by the Consumers Price Index into 2014 dollars. The numbers in Table 1 will be compared with the matching private sector figures, from Hazledine (2016, Tables 1, 2).

The average annual public sector organisation budget was $362.7 million, somewhat smaller than the size of the average listed company in 2014, which was $510 million. The biggest-spending public sector organisation was ACC – the Accident Compensation Commission – which worked its way through $4.7 billion in that year.

The highest-paid civil servant CEO was – surprisingly – a military man: the chief of the defence forces, who is paid much more than his equivalent in the United States, who in turn receives much less than the three head coaches of the army, navy and air force football teams.[8] Actually, CEO pay in the New Zealand public sector is higher on average than in the US, and indeed in every OECD country apart from Italy, a fact that we did not find noted in any of the state service commissioners' reports we read.[9]

Nevertheless, the highest-paid New Zealand CEO is not at the top of the overall public sector remuneration list: three doctors in 2014 each billed the Auckland District Health Board more than $1 million, presumably for contract specialist services. Average public sector CEO pay in 2014 was $378,000, which was just 56% of the listed company CEO average remuneration.

Total numbers of what we call 'senior managers' – people earning more than $150,000 – are actually highest for the Auckland District Health Board, which in this case is surely largely due to high pay for medical professionals. Average pay for

Table 2: Comparisons of organisational structure: public and private sectors, 2014

	Ratio CEO pay to budget or sales		Ratio total managers' pay to budget or sales		Ratio budget or sales to number of managers	
	public sector	private sector	public sector	private sector	public sector	private sector
AVERAGE: ALL	0.00827	0.00952	0.06604	0.03909	10,530,066	12,414,646
AVERAGE: SIZE>$10,000,000	0.00542	0.00672	0.06131	0.03486	11,291,797	12,798,516
AVERAGE: SIZE>$20,000,000	0.00357	0.00492	0.05683	0.03290	12,111,225	13,337,886

Table 3: Elasticities of employee numbers and top pay: public and private sectors

	Number of managers		Average manager salary		Number of other employees		CEO pay	
With respect to:	public sector	private sector	public sector	private sector	public sector	private sector	public sector	private sector
Size of organisation or firm	0.70	0.71	0.02	0.00	0.85	0.88	0.16	0.30
Number of managers							0.14	0.26
Average manager salary							-0.05	0.60

other workers in the public sector was about $82,000, which is much higher than the private sector listed company equivalent figure of around $65,000. The lowest-paid non-managerial employees work for the Ministry of Social Development; the highest for the Civil Aviation Authority, though this number, being larger than $150,000, must be wrong.

Table 2 reports averaging of three ratios which give further insights into the employment structures of public and private sector organisations. Averages are calculated first for the full sample, then successively excluding organisations with annual revenue or budgets less than $10 million, and less than $20 million, in case the overall picture is distorted by the behaviour of relatively small units.

The first column compares ratios of CEO pay to total organisation size: budget for public sector; total sales revenues for private. In organisations of a given size, private sector CEOs tend to get paid significantly more than the public sector counterparts – 38% more in the sub-sample of larger organisations. The private sector premium could plausibly be linked to the fact that private sector firms have to make profits in competition with other firms, and face the risks of bankruptcy, liquidation and takeover.

Then we calculate, average and compare the ratio of the total payroll for senior managers to organisation size. We see that the private sector firms operate with substantially leaner managerial structures, on average. That is, while the peak of the bureaucratic pyramid is lower in the public sector (lower CEO pay), the base tends to be much broader.

The third column, however, dividing size by the number of managers – which might be interpretable as managerial productivity – shows a much smaller public/private sector differential, implying that the larger total payroll ratio in the public sector is mostly due not to more managers, but to these being more highly paid, further away from the lower cut-off of $150,000 a year.

Table 3 reports estimates of 'elasticities', measuring the quantitative impact of differences in a causal variable, such as organisation size, on differences in the variable(s) of interest. These estimates come from successful econometric modelling of the data, as reported in the Appendix, Table 5.

The most powerful association is between organisation size and CEO pay: in the private sector, a doubling of size goes with a 30% increase in the CEO's remuneration, whereas the corresponding

public sector elasticity is just 16%. Given that size in the private sector is measured by market revenues, and thus plausibly a key performance indicator for CEOs, the difference is perhaps not surprising.

The number of senior managers reporting to the CEO is linked to the latter's pay, with an elasticity nearly twice as large in the private sector. There is the suggestion that private CEO pay is marked up on the average pay of senior managers, an effect not observed in the public sector. The elasticity of the number of senior managers with respect to size is very similar across public and private sectors, perhaps reflecting some bureaucratic imperative of modern organisations: double the size/hire, 70% more top managers. However, independently of the size effect there is a very strong secular trend in senior manager numbers in the private sector, which is about two and a half times larger than the trend in the public sector.

As for the average senior managerial salary: perhaps surprisingly, this shows no significant link anywhere with size, but has been trending upwards in the public sector, at more than twice the rate of public sector CEO pay. Overall, we could say that the base of the bureaucratic pyramid of senior managers has tended to

Table 4: Average percentage size-weighted annual rates of growth

	CEO pay	Size	Size-adjusted CEO pay
Spending department	1.04	2.59	0.62
Policy department	3.84	1.56	3.59
District Health Board	1.83	4.09	1.18
University	3.25	3.87	2.63
Listed companies	5.38	6.60	3.40

widen in listed companies, whereas its peak has risen in the public sector.

The elasticity of the number of non-managerial employees with respect to organisation size is also quite similar across sectors, and seems to imply mildly increasing returns to scale. Both sectors – but especially public sector organisations – have, however, been shedding non-managerial labour at quite substantial rates, with negative annual trends of around -6% and -2%.

Next, in Table 4, we partition the public sector into four groups: 29 mainly 'spending departments' (e.g. the Broadcasting Commission, the New Zealand Transport Agency); 56 mainly 'policy/regulatory departments' (e.g. the Broadcasting Standards Authority, the Ministry of Transport); 18 district health boards; and the eight universities. As well, we have calculated rates of growth for 107 listed companies in the private sector, from the database used in Hazledine (2016). The distinction between spending-oriented and policy-oriented departments is informal, but it does have some empirical bite, as we shall see. We show averaged actual annual rates of growth of CEO pay and organisation size, calculated from the first and last (2014) values of these variables, and weighted in the averaging by the 2014 size of each organisation.

The third column in Table 4 shows the average CEO pay growth adjusted for any changes in CEO pay that can be attributed simply to changes in the size of the department, agency or company, using the estimated elasticities for size effects shown in Table 3.[10]

We see that all four public sector groups lag well behind the corporate private sector in growth of both CEO pay and overall size, with public sector policy/regulatory departments or agencies showing the highest CEO salary growth

and the lowest overall size (budget) growth, such that size-adjusted CEO pay growth is actually a little higher for the – generally smaller – policy/regulatory departments.

The spending departments have been particularly circumspect in rewarding their CEOs with pay increases, at just over 1% per year – similar to real pay growth for the New Zealand workforce as a whole[11] – and less than this after allowing for increases in the size of these departments. District health board CEOs have also had rather modest pay increases, in a faster-growing sector than average. University vice chancellors have done quite well.

Differing CEO pay paths within different units of the public sector, and between public and private sectors, seem at least consistent with the State Services Commission's recognition, from 1997, of inherent differences in the skills and experience needed to effectively run private and public sector organisations; these are not the same labour markets.

Overall, some interesting differences emerge from the analysis of our data. For listed companies in the private sector, we can clearly discern a structure of unsurprising linkages between CEO pay, firm size, and pay and numbers of senior managers. The big question remaining (in New Zealand and in other English-speaking countries) is how this structure has, as it were, been inflated over time, such that CEO pay has on average doubled in 20 years.

For public sector CEOs, there is perhaps nothing exceptional about the growth of their pay since 1995, but, cross-sectionally, CEO pay linkages with organisation size and other factors are relatively weak or non-existent. Coupled with the striking fact of little New Zealand's near leadership, internationally, in how much we pay our state sector

CEOs, we may have to look for political explanations, with these dating from before 1995.

A final note. Politicians are not included in our database, but it is of interest that the pay (excluding allowances) of the most senior public sector CEO of all, the prime minister, has increased annually at the fairly modest rate of 2.3% since 1995, to reach $429,000 in 2014.[12]

Implications and conclusions

Thirty years on from the Rogernomics upheavals of 1986–88, and 20 years from the adjustments made in 1997, is it now time for a fresh assessment of top pay in New Zealand's public sector, and of the organisational structures that go with it? We think it is. However – and perhaps surprisingly – it is the private sector which has seen a doubling of CEO pay over the past two decades, and which has generated the largest growth in numbers of high-paid employees. Nevertheless, even though public sector CEO pay has barely grown, it could still be too high: does it really make sense that the professional chief of our tiny defence forces is paid more than his opposite number in Washington, as also are the heads of the major government departments? And are there signs of bureaucratic bloat in the relatively high levels of senior employees in the public sector for given organisation size, and in the upwards creep of their average pay?

1   So nicknamed after Roger Douglas, the crusading minister of finance in the Labour government elected in 1984.
2   The New Zealand Official Yearbook 1978 does not list the names of the heads of the then 40 government departments, but in describing their duties uses 'he' and 'his' throughout (page 47). The Ministry of Women's Affairs was set up in 1985, and headed by Mary O'Regan, the first female department head.
3   The Reserve Bank's inflation calculator tells us that the Consumers Price Index rose by 29% from Q2 1988 to Q2 1997.
4   The three exceptions are the SSC itself, the GCSB (spy agency) and the Crown Law Office.
5   For broader accounts of the advance and (partial) retreat of 'new public management' doctrines in the New Zealand public sector, see Whitcombe (2008) and Hughes and Smart (2012).
6   Policy advice is one of three intrinsically public service duties enumerated by the state services commissioner. The other two are: 'exercising the authority of the state' (collecting taxes, setting regulatory frameworks); and 'direct interventions in social and economic conditions'. The general points made by the commissioner in the paragraph quoted above would seem to apply equally to the management of these other duties.
7   Currently, the 11 surviving SOEs generate annual revenues totalling $5.4 billion, which is about the size of the budget of Auckland City (https://mcculloch.org.nz/state-owned-enterprises/).
8   The chief of the New Zealand Defence Force usually receives an annual remuneration package in the $600–700,000

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Appendix: Econometric modelling of CEO pay

Table 5 summarises the results of Ordinary Least Squares regression models for CEO pay in public and private sectors. The modelling approach follows that developed in Hazledine (2016), and is further explained in Hazledine et al. (2017). The main variables were introduced above, in sections two and three. The coefficients of variables entered in natural logarithms can be read off as elasticities, showing the percentage difference in CEO pay associated with a given percentage difference in the explanatory variable. Organisation SIZE is also a determinant of the number of senior MANAGERS and their pay (TOPSALARY), which would result in 'multicollinearity' problems if all three are included as regressors in the model. Basically, the variables would get in each other's way, blurring their individual effects on CEO pay. To deal with this, actual values of MANAGERS and TOPSALARY are divided by their 'forecast' values from separate regressions on SIZE and the time trend variable, YEAR. 'Dummy variables' are

included to allow for district health board (DHB), FIRE (finance, insurance and real estate) effects, as well as the possibility that CEOs in particularly profitable listed companies (RORHIGH) get paid more. See Hazledine et al. (2017) for details.

Both public and private sector CEO pay models have reasonably high R^2 values, given that this is essentially a cross sectional model.

Table 5: Public and Private Sector regressions for CEO pay Dependent Variable: log(CEOPAY)

Dependent Variable: log(CEOPAY)				
	Public sector		Private sector	
number of observations	158		205	
	coefficient	t-stat	coefficient	t-stat
constant	-9.641	-1.75	-64.922	-9.88
log(SIZE)	0.157	17.30	0.302	20.66
log(MANAGERS/ MANAGERSF)	0.137	7.59	0.265	8.10
log(TOPSALARY/ TOPSALARYF)	-0.046	-0.88	0.597	4.78
YEAR	0.010	3.56	0.034	10.29
DHB	-0.277	-6.88		
FIRE			0.205	2.26
RORHIGH			0.113	2.14
R-squared	0.684		0.751	
adjusted R-squared	0.674		0.744	

Todd Krieble and Danijela Tavich

Civics and Citizenship Education in New Zealand

A CASE FOR CHANGE?

Introduction

The 2013 Constitutional Advisory Panel recommendation for a national strategy for civics and citizenship education in schools, kura (Māori-medium schools) and communities provided the opportunity for an important conversation about building civic knowledge in Aotearoa New Zealand (Constitutional Advisory Panel, 2013, p.8). This article explores possible next steps for implementing this recommendation. It is broken up into two parts: a case for change, and potential next steps.

A case for change

This article explores both civics and citizenship education (collectively referred to as CCE). Civics education addresses the formal institutions and processes of civic life, such as voting in elections, while citizenship education addresses how people participate in society and how citizens interact with communities and societies. Knowledge and understanding of both civics and citizenship concepts constitutes broader 'civic knowledge' (Bolstad, 2012, p.7).

CCE is discussed here with a view to improving civic engagement in New Zealand. Civic engagement describes 'how an active citizen participates in the life of a community in order to improve conditions for others or to help shape the community's future' (Adler and Goggin, 2005, p.241). This includes voting, as well as broader activities such as donating to charity. Civic engagement is a fundamental part of building and maintaining strong democracies (Blakeley, 2016, pp.99-10).

There is substantial international evidence that democratic polities enjoy better economic and social outcomes, leading to overall higher levels of well-being (Acemoglu and Robinson, 2012). If we accept this and also accept that New Zealand is a well-functioning democracy worth preserving (see World Bank, 2016), then there are three current trends that, unless attended to, will undermine the quality of our democracy. This section builds on these trends with an outline of existing research about CCE and the current conditions for CCE in New Zealand.

Loss of a common platform for public discourse

Traditional forms of 'slow' media, such as high-quality, investigative, public interest journalism, are subject to declining profitability and funding restrictions. This has prompted a shift in the market towards digital communication through

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channels such as social media, which offer greater potential for the generation of advertising revenue (Armitage, 2016) and favour immediacy and entertainment value (Drok and Hermans, 2016, pp.539-41). Despite response to these pressures, such as the online transformation of public broadcaster Radio New Zealand and its recent increase in public funding through New Zealand on Air, the decline of slow media remains an issue for citizens seeking to stay informed (Pullar-Strecker, 2017; Radio New Zealand, 2013).

These problems are exacerbated by an increase in the diversity of channels for news on the internet, making it difficult to identify quality information. While this diversity may be positive overall, it represents another aspect of the shift away from professional journalism (Gault and Krieble, 2016, p.35). Additionally, increasing diversity has caused a burgeoning of 'fake news': false and misleading news stories that can be shared widely online (Allcott and Gentzkow, 2017, pp.1-3). A recent survey by the Pew Research Center found that 64% of US adults say fake news causes a great deal of confusion about the basic facts of current issues and events (Barthel, Mitchell and Holcomb, 2016).

The growing reliance of citizens on social media for news is also causing issues such as online 'filter bubbles'. Because social media platforms such as Facebook determine what content users see based on their connections and which pages they already interact with, individual news feeds can become an echo chamber, reinforcing personal biases (El-Bermawy, 2016). This does not bode well for civility, which centres on seeing your opponent as a fellow citizen, rather than the 'other' or enemy, and emphasises respectful, balanced and constructive public discourse and debate (Rashbrooke, 2017).

Lack of knowledge about and interest in how democracy works
The 2008 International Civic and Citizenship Education Study (ICCS) revealed that New Zealand has some of the highest and lowest scores internationally for civic knowledge. No other country in the study had such a wide distribution (Lang, 2010, p.6). At the bottom end, Māori

and Pasifika males had the most limited knowledge of democracy (ibid., p.9). This indicates that a 'civic empowerment gap' exists (see Levinson, 2012, pp.32-3), which appears to mirror the other inequalities in our society (see Marriott and Sim, 2014, pp.26-7; Rashbrooke, 2013, pp.1-6). The ICCS study found no clear pattern of association between students' average knowledge scores and their level of interest in social and political issues, nor their intentions for future civic action (Hipkins and Satherley, 2012, p.31). These results point to a need for something other than content or more 'academic' civic knowledge in the New Zealand curriculum to encourage interest and participation.

Although evidence suggests that youth are more engaged than we think, this engagement is occurring externally to conventional forms of participation such as voting, instead focusing on activities like volunteering (Wood, 2017). The last three general elections have seen falling electoral enrolment rates in age groups between 18 and 39, despite enrolment technically being compulsory in New Zealand (Electoral Commission, 2015, p.45; New Zealand Government, 2017). Further, Māori and Pasifika voters have consistently lower turnout rates than Pākehā (Statistics New Zealand, 2014, p.9). CCE could provide opportunities for addressing these issues by demystifying the enrolment and voting process, and perhaps even helping eligible students to enrol.

New Zealand is becoming increasingly diverse, but the high rate of non-voting among migrants could indicate possible issues for civic engagement. In 2015/16 resident visa approvals were up 21% from

2014/15 (Ministry of Business, Innovation and Employment, 2016, p.iv). This growing diversity enriches New Zealand (Gault and Krieble, 2016, p.34), but almost 60% of recent migrants did not vote in the 2011 general election (Statistics New Zealand, 2014, p.9). As many migrants come from countries with weak democracies (Economist Intelligence Unit, 2016), it is important that knowledge barriers to engagement are reduced and that individuals are supported to access the civic institutions and exercise the rights they are entitled to as members of New Zealand society (Palmer and Butler, 2016, p.12). However, it must be noted that a limitation of 'citizenship' terminology is that it may foster an

> Teachers have significant discretion over how they teach under the New Zealand Curriculum and Te Marautanga o Aotearoa, which are based on learning areas, principles and values …

assumption that only citizens can vote, when permanent residents are also eligible to enrol and vote in New Zealand (Electoral Commission, 2016). This must be kept in mind when discussing CCE to avoid perpetuating such ideas.

Inconsistency in what constitutes CCE
Teachers have significant discretion over how they teach under the New Zealand Curriculum and Te Marautanga o Aotearoa, which are based on learning areas, principles and values (Ministry of Education, 2007, pp.7, 37). The flexibility of the New Zealand Curriculum appears to be advantageous but can be challenging in the case of CCE. The problem is that there is no consistency about what constitutes CCE; nor is there any explicit requirement that CCE be taught (Harris, 2017, p.246). This approach disadvantages students who are not taught CCE or who are taught less comprehensive CCE (ibid., pp.246-50). Given that the low civic knowledge scores in the ICCS study were

found to have a strong association with poorer socio-economic backgrounds, CCE becomes one way to equip all students with the knowledge and skills they need to empower themselves (Lang, 2010, p.10).

In addition, the quality and accessibility of resources available to support CCE requires attention. The recent Ministry for Culture and Heritage's citizenship education resources survey evaluated the current state of resources and used criteria drawn from the outcomes of Aitken and Sinnema's Best Evidence Synthesis (BES) in social sciences, which examined effective pedagogy in social sciences, to assess the quality of a sample of these resources

which CCE is taught is important (Wood and Milligan, 2016, p.70). For example, in a 2008 study of 52 high schools in Chicago, Kahne and Sporte found that 'active citizenship' approaches were most successful in leading to increased civic engagement. Active citizenship approaches link learning to real-world contexts, for example, by following current events and allowing students to study and think critically about social issues that matter to them (Kahne and Sporte, 2008, pp.738, 745-56; Wood and Milligan, 2016, p.70). Other research shows that the effects of CCE in community education for adults are similar to the effects on school students (Finkel, 2014, pp.170, 178; Gastil, 2004, pp.325-6).

explicit references to 'citizenship': for example, notions of citizenship are a key part of the 'future focus' principle (Harris, 2017, p.247; Ministry of Education, 2007, pp.10, 12). Furthermore, CCE could help to fulfil three of the five overall key competencies of the curriculum: thinking, relating to others, and participating and contributing (Ministry of Education, 2007, pp.12-13).

Social studies presents as the existing subject most compatible with notions of CCE (Wood and Milligan, 2016, p.66). Social studies teachers from secondary schools across the country are already working together to form ideas for how to implement the NCEA 'personal social action' achievement standards for social studies in a way that can address the gaps in CCE in the curriculum. These achievement standards were introduced in 2013 and encourage students in years 11–13 to take social action on an issue of their choice, providing an opportunity for active citizenship learning (Massey University, 2016).

Personal social action approaches to date include a teacher who took students to Wellington to learn about the way Parliament works and a teacher whose class visited the Beehive to make a submission at the select committee hearing on the Healthy Homes Guarantee Bill (ibid).[1] A recent study by Wood et al. on the implementation of these standards found that, when students were well supported and were tackling personally significant issues, the standards were valuable for learning about society and social issues, as well as for developing civic and community engagement skills (Wood et al., 2017, p.16).

Tikanga ā-iwi, the subject parallel to social studies in kura, also appears to be compatible with CCE, with the subtext of tikanga ā-iwi being a strong emphasis on the realisation of rangatiratanga through active citizenship (Dale, 2016, p.27). However, it should be noted that Māori conceptions of citizenship are inherently different from Western perspectives. Consequently, CCE resources and strategies developed for tikanga ā-iwi must align with the specific vision of tikanga ā-iwi (ibid., pp.20-7).

> The issue of consistency is exacerbated by the fact that existing notions of citizenship in the New Zealand Curriculum are vague and provide little clear direction for teachers …

(Aitken and Sinnema, 2008; Tallon, 2016, p.3). The criteria are grouped into five overarching categories of social sciences outcomes pertaining to: students' knowledge and understanding of concepts; students' skills in using social sciences methods and techniques; students' ability to participate, contribute and engage in dialogue; students' awareness of personal, cultural and layered identities; and students' dispositions and emotional responses to learning (Aitken and Sinnema, 2008, p.37). It was found that although there are many resources available for civics and citizenship education, they can be difficult to locate, lack coherence and are of varying quality (Tallon, 2016, p.16).

Existing research

Existing research also supports the case for change in CCE in New Zealand (see Harcourt, Milligan and Wood, 2016; Mutch, 2013; Wood and Mulligan, 2016). The evidence indicates that the way in

International evidence also indicates that CCE can address gaps in knowledge inequalities. In a 2016 study looking at the United States and Belgium, Neundorf, Niemi and Smets found that civic education can have compensation effects for missing parental 'political socialization' (p.947). Schools were found to be able to compensate for the 'civic empowerment gap' between young people from privileged backgrounds who were more likely to have access to academic resources, political news and the public sphere generally, and those from impoverished backgrounds (Levinson, 2012, pp.32-3; Neundorf, Niemi and Smets, 2016, p.922). The ICCS study cited earlier also provides evidence to support this finding (Schulz et al., 2010, p.258).

**CCE and the New Zealand Curriculum**

CCE is not currently part of the New Zealand Curriculum, but the curriculum does include areas in which CCE could be incorporated. There are already some

The issue of consistency is exacerbated by the fact that existing notions of citizenship in the New Zealand Curriculum are vague and provide little clear direction for teachers in implementing the principles and values consistent with citizenship (Wood and Milligan, 2016, p.67). This is evident in the findings of the final report of the ICCS study, which concluded that, overall, 'it is somewhat unclear whether there is a consistent view across New Zealand schools about what "civics and citizenship education" ought to involve and what means are effective in developing students' citizenship competencies' (Bolstad, 2012, p.32).

Given that there is much evidence of the importance of CCE, and literature detailing appropriate pedagogy, it is worth considering why CCE is not more prevalent in New Zealand. It has been suggested elsewhere that the pressure and narrow foci of national standards and NCEA assessment and the top-down emphasis on literacy and numeracy have led to these being the subjects reported on and prioritised at the expense of other areas of the curriculum (Harcourt, Milligan and Wood, 2016, p.xiii; Thrupp and White 2013, pp.19-20; Wylie and Bonne, 2016, p.25). As outlined by Harcourt, Milligan and Wood, this has led to the marginalisation of social studies, and can explain the inconsistency of the current approach to CCE (2016, p.xiii). Evidence of poor learning progress for social studies students in years 4–8 in comparison with other subjects suggests that such marginalisation is affecting learning in this area (National Education Monitoring Project, 2005, 2009, cited in Wood and Milligan, 2016, p.68).

It seems that furthering CCE would entail not only addressing issues like consistency, but also some reconsideration of sector priorities. Such reconsideration may not require absolute policy trade-offs: existing priorities are not fundamentally incompatible with CCE and could be revisited with a view to reconciling them with CCE. CCE can provide rich content for literacy and numeracy learning through topics such as voting statistics or political speeches (see Fraser, Aitken and Whyte, 2013, pp.171-3).

Figure 1: Three Cs framework for CCE
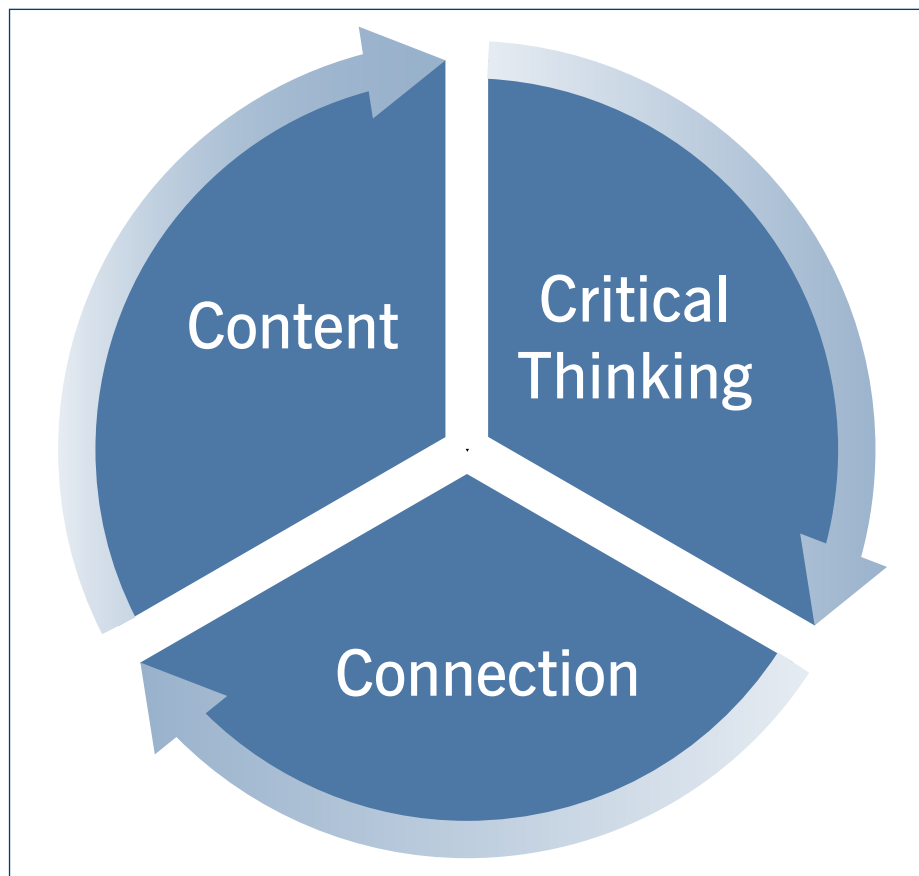
CCE in the community

In terms of community CCE, work is already underway, with resources for community CCE developed by the Electoral Commission with input from Adult and Community Education (ACE) Aotearoa that provide a template for community groups to start learning about civics and citizenship (Electoral Commission, 2012). Further, information on the 2017 election is available through the Electoral Commission in 27 languages, and English Language Partners NZ has also produced a resource for its work with refugees and migrants (Electoral Commission, n.d.; English Language Partners NZ, 2017). There are numerous other examples, including civics education workshops run by ACE Aotearoa with a focus on prison inmates (ACE Aotearoa, 2015, p.23), the work of Active Citizenship Aotearoa (Wood, 2017), and the Victory Community Centre in Nelson, a community hub connecting the local school and wider community with a focus on building connection and engagement (Stuart, 2010, p.86). However, this work will have limited impact while there is

no coordination between efforts and few resources available for community CCE. Furthermore, there is limited funding for community education in general, with cuts to ACE Aotearoa in recent years having a significant impact (Pollock, 2012).

Potential next steps

This article has set out three reasons why civics and citizenship education needs attention if New Zealand is to remain a well-functioning democracy: loss of a common platform for public discourse; lack of knowledge of and interest in how democracy works; and inconsistency in what constitutes CCE. Although we argue that there is a case for change, the current state of CCE in the education and community sectors is not one of crisis. Rather, it presents a picture of promising foundations and existing efforts that would benefit from greater support, strengthening and coordination. This section outlines some next steps drawn from the McGuinness Institute's May 2017 CivicsNZ workshop, and is set out under the Three Cs framework.

A framework for CCE

Figure 1 shows the Three Cs framework for CCE, adapted from Gault and Krieble (2016). The framework outlines three critical components of CCE which would address the three trends that are threatening the quality of our democracy. *Content* refers to information or 'academic' knowledge about civics and citizenship; *critical thinking* refers to the ability to critically assess and process information; and *connection* refers, firstly, to the application of information to problems in everyday life, and secondly to a sense of belonging to a specific community within society. The importance of connection and critical thinking in CCE, rather than just content, draws from evidence of

Marautanga o Aotearoa and tikanga ā-iwi in kura. However, it may also be necessary to reconsider the current priorities of the education sector. Arguably, subjects like social studies will remain second best until these priorities are revised or even reimagined, by, for example, exploring options for teaching literacy and numeracy through social studies in order to 'elevate' the subject (see Wood and Milligan, 2016, p.71). Although some NCEA literacy credits can already be assessed through social studies, this could be extended by offering more credits, exploring options for aligning the subject with numeracy credits, and recognising the compatibility of social studies with literacy, numeracy,

online CCE hub would make it easier for educators and communities to identify and access CCE content and resources (Tallon, 2016, pp.19-20). The BES method for assessing the quality of citizenship resources could be used to select resources for inclusion in this hub and to guide the development of future resources (Aitken and Sinnema, 2008; Tallon, 2016, p.3).

The idea of CCE hubs is also viable in a community context. For communities that have built or want to build a civics hub, such as the Victory Community Centre in Nelson, it may be worth looking to the Ministry of Education communities of learning/kāhui ako model, which links networks of schools and kura, as a possible foundation for this (Ministry of Education, 2016). The networks within this model could be used to link schools with their communities in ways which foster a sense of belonging, inclusivity and learning, with CCE extending into the community experience (Wood and Milligan, 2016, p.70). Increases in funding may be necessary if CCE is to be accessible to adult learners and those outside the mainstream education sector.

Existing CCE hubs and other community organisations and efforts will be more effective if they are coordinated, working to build relationships and share resources and experiences. Coordination could be facilitated by government or by one of the existing community groups working in this space. The development of further resources suitable for community CCE, similar to the Electoral Commission's resources, would also be beneficial for supporting community CCE.

> Though no panacea, CCE can serve as a means of securing the democratic character of New Zealand, and ensuring that all can be a part of shaping the future.

effective pedagogy for engendering civic engagement (see Aitken and Sinnema, 2008; Harcourt, Milligan and Wood, 2016; Mutch 2013; Wood and Milligan, 2016).

Content
Bolster social studies and consider policy trade-offs

Making CCE an explicit learning outcome of the New Zealand Curriculum would help to address issues of consistency. The learning targets for CCE might then be met within the existing subject of social studies. Social studies could be bolstered to support teachers to address CCE with active citizenship approaches and by drawing on existing best practice examples of social studies teachers' work.

Bolstering social studies might entail professional development and guidance, such as advisory support for teachers, as has been available in the past (Aikin, 1995, pp.68-70). Further consideration is necessary regarding whether and how CCE might fit with the vision of Te

New Zealand Curriculum and University Entrance priorities (NZQA, 2017a, 2017b).

Aligning curriculum objectives

CCE might also be linked to other areas of the curriculum beyond social studies, as in the earlier example of linkages between mathematics and CCE through topics like voting statistics. Prospective and practising teachers could be supported by the Education Council and teaching colleges to align curriculum objectives and subject knowledge. This would help to embed the concepts of civics and citizenship in everyday life (Fraser, Aitken and Whyte, 2013, pp.18-20).

Pull together CCE hubs and coordinate existing efforts

Consistent with the recommendations of the Ministry for Culture and Heritage citizenship education resources survey, a single point of coordination and

Critical thinking
Active citizenship approaches and knowing where to look for news

Critical engagement with current affairs is part of active citizenship. In an era of instant social media and the ability of practically anyone to produce and distribute 'news', critical thinking skills are essential. This highlights the importance of active citizenship approaches to CCE, which entail critical thinking and assessment, as a way to support learners to develop these essential critical thinking skills and help individuals seek out and recognise reliable news sources.

Role for public interest media

The role of public interest media outlets becomes particularly important for informing public debate and active citizenship when the capacity to critically appraise news and its sources is limited. The 2017 budget increase for Radio New Zealand partially recognises the importance of a trusted public interest media outlet. However, rather than being part of the budget for New Zealand on Air, Radio New Zealand should have a stand-alone budget so that budget trade-offs are transparent and its crucial role for democracy is recognised.

Connection

Civic engagement is more than voting

Civic engagement takes many forms. There may be value in beginning a national conversation about what we mean when we talk about citizenship, civic engagement and participation. The above-mentioned evidence that people may be participating in civics and citizenship in little-acknowledged ways indicates that citizenship and engagement are not straightforward, static concepts. There is a need to democratise the definitions of civics and citizenship and to co-produce CCE to ensure that it is useful and accessible. How CCE can incorporate concepts like civility, to help underpin political discourse with respect and to further a sense of connection in New Zealand, should also be considered here.

Engaging the disaffected

Government should do more to support the participation of groups in society that are less engaged and are under-represented in voting and other citizenship-related statistics. Working partnerships between Māori, Pasifika and migrant communities and government agencies such as the Ministry of Youth Development, the Ministry of Social Development, the Ministry of Education, the Department of Internal Affairs and the Electoral Commission may be able to turn civic engagement figures around by appealing to the issues that matter most to these groups, learning more about the driving forces behind disengagement, and co-producing CCE approaches that are relevant and relatable for diverse audiences.

Conclusion

There are strong arguments for safeguarding democracy. Democratic societies are more prosperous, both socially and economically. The three drivers outlined in this article that threaten to undermine the strength of democracy in New Zealand are a significant concern: a loss of a common platform for public discourse; a lack of knowledge about and interest in how democracy works; and inconsistency in what constitutes CCE.

In response to such threats, we propose a case for change to the current state of CCE. There is evidence to support consistent and comprehensive CCE across schools and communities as an effective intervention for preserving and future-proofing democracy. Further, CCE can address the distributional problems in civic knowledge that have led to the apparent development of a civic empowerment gap in New Zealand, which, in turn, reinforces many of the inequalities we see in society today.

We suggest some next steps that come together as a vision of coordination across a range of actors, such as schools, kura, communities, government, not-for-profit organisations, the media and the private sector. CCE could be made an explicit learning outcome in the New Zealand Curriculum. CCE can support existing priorities for numeracy and literacy, and has a natural home in social studies. Consequently, we argue that social studies should be bolstered to facilitate CCE, through changes such as improved, curated access to online resources and advisory support for educators. Though no panacea, CCE can serve as a means of securing the democratic character of New Zealand, and ensuring that all can be a part of shaping the future.

1   Here, it is worth considering some safety protocols for ensuring the privacy of students when making submissions, such as the use of school rather than personal details.

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Belinda Storey and Ilan Noy

Insuring Property
under Climate Change

Climate change will increasingly create severe risks for New Zealand's coastal housing stock. Even a small amount of sea level rise will substantially exacerbate the costs of flooding and storm surges (Parliamentary Commissioner for the Environment, 2015). Under the Intergovernmental Panel on Climate Change's (IPCC) three mitigation scenarios, global average sea levels are likely to rise by between 28cm and 73cm by 2100 (above the 1986–2005 average). Under the IPCC's high emissions scenario the sea level is likely to rise by between 52cm and 98cm by 2100 (IPCC, 2013). Only collapse of parts of the Antarctic ice sheet, if triggered, could cause the sea level to rise substantially above these ranges. Some regions in New Zealand (including the main urban centres) have high enough quality geographic data to infer the number of homes at risk. In those regions, there are over 43,000 homes within 1.5m of the present average spring high tide and over 8,000 within 50cm (Bell, Paulik and Wadwha, 2015).

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In the best of all possible worlds New Zealand would face far fewer risks from climate change. Sound science would communicate future risk, which would be understood by all decision makers. These decision makers would make socially optimal decisions and would coordinate across all levels and parts of government. Existing homeowners would take risk into account when making housing investment decisions. Home buyers would take risk into account when purchasing, and this would affect both what they purchase and how much they are willing to pay. Developers would take future and current climate risk into account in siting and designing developments. Insurers would pool the residual risk across individuals, and would obtain affordable reinsurance in international markets. Councils would credibly commit to an adaptive decision-making approach for land use and building decisions and would continue to adjust this approach as the climate, and sea level, change. Alas, we do not live in this Panglossian dream.

In reality, there is limited information about how climate risks will change over time and the information that is available is often not accessible to the layperson.

Even with good information, people often make poor decisions under different types of uncertainty: they overreact to small threats, easily forget previously observed loss, and exhibit optimism bias when risks are high. They often discount future events heavily and do not plan well for them.[1] These same obstacles and barriers faced by homeowners and renters also afflict, of course, policymakers, and the employees of private sector entities involved in residential housing, such as banks and insurers.

When coastal disasters occur, homeowners experience significant losses and displacement. Some may be forced to permanently leave their community after a single and sudden-onset disaster like a storm surge, flash flood or landslide, or following a series of smaller events that accumulate to large losses (Moftakhari et al., 2017). Property developers and existing homeowners may seek to block the transmission of information about risk to potential home buyers. Local and central government may face high costs from protective measures and continued provision of infrastructure when abandoning housing may be more efficient. Local authorities, and their insurers, may find themselves holding unexpected liabilities if future courts rule that councils are liable for resource consents provided to homes threatened by climate change. All this may happen, and almost surely will.

Climate change will render some currently inhabited locations uninhabitable. This transition could well be costly for individuals and their communities. It is not yet known how many locations will face this transition over the next few decades. Many of the costs considered in this article will be accrued in the more distant future. The traditional use of government discount rates might portray such costs several decades from now as innocuous. Heavily discounting the future losses from past and present actions is generally inappropriate, however, especially when those harmed will be uncompensated (Cowen and Parfit, 1992; Stern, 2015). Moreover, discounting is incongruous with the emphasis within mātauranga Māori on safeguarding treasures that have

been passed down by past generations (Awatere, 2008). The assets which will be exposed to climate change decades hence are being built now, so the far-reaching consequences of current decisions should be reflected in current policy (Stephens, Bell and Lawrence, 2017).

Here, we focus on how escalating coastal housing risks induced by sea level rise, coastal storms and extreme precipitation will affect the future availability of insurance in New Zealand. Insurance does not reduce risk. Instead, insurance allows one party (the insured) to transfer some of its risk to another

> Climate change may make the calculation of actuarially precise premiums more difficult as changes to hazard frequency and intensity render historical data less relevant.

party (the insurer) through a financial contract which compensates the insurer for the receipt of the transferred risk. Evidence from international markets suggests that when a risk is perceived to have increased and become unprofitable to transfer, insurance companies classify affected areas as 'uninsurable' and withdraw insurance altogether. The New Zealand government plays a major role in the provision of some natural disaster insurance through the Earthquake Commission (EQC). Several other features differentiate the New Zealand residential property insurance sector from those in other countries. First, New Zealand has mostly international insurers in the local market. Second, disaster insurance take-up is unusually high (probably around 90-95%), because it is automatically attached to fire insurance. Third, prudential regulation of New Zealand insurers is quite recent and does not constrain the product categories in which an insurer may operate (Dean, 2010). Fourth, the New Zealand insurance industry has historically offered all-perils coverage, including major natural hazards

such as earthquakes and floods that are often excluded elsewhere.

Other institutions are also used to manage risk. *The New Zealand Coastal Policy Statement 2010*, established under the Resource Management Act (RMA), is the overarching planning document regarding New Zealand's coasts along with part 2 matters in the RMA. Each regional council is required to prepare a regional coastal policy statement which outlines how, among other matters, the regional council addresses management of natural hazards (including climate change) and must give effect to the national policy. *The New Zealand Coastal Policy Statement* states that a precautionary approach should be adopted to resource use and development in coastal environments wherever the effects of activities 'are uncertain, unknown, or little understood, but potentially significantly adverse' (policy 3). It highlights climate change as a particularly important source of vulnerability for coastal resources and outlines policies for identifying and managing coastal hazards, including the effects of climate change (policies 24–27) (Department of Conservation, 2010). Local councils are responsible for managing risk insofar as they construct infrastructure and make planning decisions which affect exposure to coastal hazards.

Issues with pricing climate-sensitive insurance

Climate change may make the calculation of actuarially precise premiums more difficult as changes to hazard frequency and intensity render historical data less relevant. In recent decades most of the increase in global coastal risk has

come from increased exposure through urbanisation and economic development (McGranahan, Balk and Anderson, 2007). However, as the sea level rises at faster rates, and storms intensify, changes in hazards are expected to replace changes in exposure as the primary driver of escalating coastal risks (Prudential Regulation Authority, 2015).

As the global sea level rises, king tides, storm surges and waves will reach further inland. Research commissioned by the Parliamentary Commissioner for the Environment has demonstrated that even modest increases in the sea level will dramatically reduce the return period of major events. For example, with a 10cm

International experience suggests that in the absence of an EQC-type scheme, most homeowners do not insure against natural hazards and governments are compelled by public pressure to provide ad hoc assistance

sea level rise the return period for a one-in-100-year storm surge in Wellington will reduce by a factor of five to a return period of one in 20 years. Once the sea level has risen by 30cm, a one-in-100-year event is expected to become an annual event in Christchurch and Wellington. The global sea level is projected to rise by between 17 and 38cm by 2065 (IPCC, 2013).

The resolution of climate models is such that it is difficult to predict even large events such as tropical cyclones (Roberts, Colle and Korfe, 2017; Walsh et al., 2015). Nevertheless, most climate models predict that while the number of tropical cyclones in the South Pacific will reduce slightly, the proportion of tropical cyclones that reach category 4 and 5 will increase and the path of tropical cyclones will move poleward (Holland and Bruyere, 2014; Kossin, Emanuel and Vecchi, 2014; Munich Re, 2016; Ramsay, Camargo and Daehyun, 2014; Woodruff, Irish and Camargo, 2013). This could increase the probability that a tropical cyclone

undergoes an extratropical transition that results in a large storm surge in Auckland or Tauranga, where many exposed homes and businesses are located.

Accurate estimates of future coastal hazards are further limited by deep uncertainties around polar ice sheet response and future global emission pathways, the high collection cost of up-to-date high-resolution land elevation and asset data sets, and the limited precision of risk models for extreme events and their actuarial counterparts.

The price New Zealand pays for reinsurance in global financial markets is an important determinant of the retail cost of insurance. If international reinsurance markets harden – currently they are facing historically low costs of financing – the reinsurance premiums paid by EQC and New Zealand's private insurers could significantly rise. Since New Zealand catastrophic risk is uncorrelated with other markets, reinsurers are more likely to raise prices than to leave the New Zealand market altogether, but reinsurers may ultimately withdraw cover for some perils, such as storm surges or earthquakes.

Demand for residential insurance
Even risk-averse individuals tend to underestimate risk, particularly low-probability, high-impact risk (Kousky, Michel-Kerjan and Raschky, 2017; Kunreuther and Pauly, 2004; McClelland, Schulze and Coursey, 1993). Demand for insurance often increases immediately following a catastrophic event (Browne and Hoyt, 2000; Michel-Kerjan and Kousky, 2010), but returns to modest levels within a few years (Gallagher, 2014). In locations that have not experienced an

event for a number of years, or where the average household tenure at that location is short, the demand for catastrophic insurance is likely to be subdued.

International studies have found that the demand for insurance cover for catastrophic events is more price sensitive than for insurance for non-catastrophic events (Botzen and van den Bergh, 2012; Grace, Klein and Kleindorfer, 2004). When insurance premiums for low-probability events rise in price, individuals may stop insuring or may under-insure, even when those premiums are subsidised below their true actuarial cost (Dixon at el., 2006; Petrolia, Landry and Coble, 2013). Those with lower incomes are somewhat less likely to buy catastrophic insurance than those with higher incomes (Grace, Klein and Kleindorfer, 2004).

The combined effect of price and income means that as insurance premiums consume a greater proportion of disposable income, homeowners are less likely to retain insurance (Landry and Jahan-Parvar, 2011) and demand for insurance falls faster for lower-probability, high-impact risk (i.e. the risk from catastrophic events) than it does for higher-probability, low-impact risk (i.e. frequent nuisance events) (Grace, Klein and Kleindorfer, 2004). In other words, if the AEP (annual exceedance probability) of an event doubles from 0.5% to 1% (i.e. if a one-in-200-year event becomes a one-in-100-year event), insurance demand is likely to fall by a greater amount than if the AEP doubles from 2% to 4% (i.e. if a one-in-50-year event becomes a one-in-25-year event).

The Household Economic Survey conducted by Statistics New Zealand suggests that average household expenditure on building insurance has almost doubled since the first Canterbury earthquake in 2010, from $540 in 2010 to $1,051 in 2015 (New Zealand Treasury, 2017). This includes the 2012 increase in EQC premium rates from 5 cents to 15 cents per $100 cover, but not the November 2017 increase to 20 cents. As insurance premiums take up a larger proportion of disposable income, more low-income households are likely to under-insure or allow their insurance policies to lapse.

Homeowners may not purchase insurance if they believe that they will be compensated by government. International experience suggests that in the absence of an EQC-type scheme, most homeowners do not insure against natural hazards and governments are compelled by public pressure to provide ad hoc assistance (Kousky, Michel-Kerjan and Raschky, 2017; Kunreuther and Michel-Kerjan, 2014). This may encourage homeowners to avoid insurance, thereby increasing the future fiscal risk for government if it is induced to provide compensation (Raschky and Weck-Hannemann, 2007; Raschky et al., 2013).

Following the Canterbury earthquakes, the government did not assist homeowners who had not purchased insurance except where it was compelled to do so for property that was red-zoned.[2] Any public objection to that decision was muted, as the number of people who reportedly did not have insurance was very small. Public objection and government response after a climate change-related disaster may be very different if the number of uninsured properties is higher where insurance had previously been prohibitively priced for affected communities, or if the event is perceived to be at least partially a consequence of government failure.

Case study: Edgecumbe and Cyclone Debbie
In general, in the immediate aftermath of natural disasters public officials face intense pressure to offer support, particularly to those households and businesses that for whatever reason are not insured (Boston and Lawrence, 2017). Public support for ad hoc assistance is bolstered by media coverage of natural disasters and can reinforce expectations that relief will be offered in similar situations in the future (Seifert et al., 2013). For example, immediately following the Edgecumbe floods caused by extratropical Cyclone Debbie in 2017, the prime minister, Bill English, acknowledged that 'there's probably going to be people there who aren't insured or for whom it's had a huge impact' and suggested that public assistance would be offered to households to work through 'their immediate issues and then if the long-term one is lack of insurance then

we'll have to deal with that then' (Radio New Zealand, 2017). The government also offered a $700,000 support package to approximately 100 affected businesses (Morton, 2017), thereby creating a disincentive for businesses to purchase business continuity insurance for future events.

Public supply of residential insurance
The government believes it is important to help private property owners avoid 'socially unacceptable distress and loss in the event of a natural disaster' (New Zealand Treasury, 2015). EQC has helped ensure greater insurance penetration in

New Zealand so that homeowners have a much higher take-up rate of catastrophe insurance than is the case in other countries (New Zealand Treasury, 2015).

EQC protects private residential property and contents from damage by earthquake, volcanic eruption, hydrothermal activity, landslip, tsunami, or fire caused by natural disaster. EQC land cover extends the range of perils to include storm and flood hazards, but excludes coastal erosion. EQC does not cover damage to residential structures or contents from storm or floods (or coastal erosion).

EQC premiums are collected by private insurance companies and are embedded within residential insurance policies that include fire insurance. Consequently, if private insurers withdraw from certain markets, homeowners would need to apply directly to EQC for cover. It is not clear how many homeowners would seek to do so and what administrative

demands this would place on EQC and on its interactions with the private insurance sector. Retreat by private insurers from particular locations could increase the unfunded fiscal risk to the Crown associated with private property in natural disasters, should the Crown elect to provide relief to uninsured homeowners (ibid.).

Applying a standard (flat) EQC premium price nationwide helps spread the risk faced in more hazardous locations across all policy holders. This makes catastrophe insurance affordable for those who are most exposed and helps ensure high insurance penetration. In doing so,

> EQC does not protect against erosion caused by slow-onset events or rising seas, but the courts may hold EQC liable for land loss caused by storms – many of which will be more destructive with sea level rise and changes in extreme precipitation.

however, it also mutes the price signal which otherwise may discourage or shape development in more hazardous locations.

The nature of EQC land cover is currently being reconsidered as part of the review of the Earthquake Commission Act 1993. There is, apparently, no current proposal to remove EQC's land cover for storms or floods (ibid.).[3]

In May 2017 the New Zealand government announced an increase to EQC's premiums (also known as the EQC levy), effective from 1 November 2017 (EQC, 2017). This increase was designed to ensure that the premiums paid by homeowners reflected EQC's long-term costs, including expected future losses from natural hazards. Historically, 85% of EQC's historical land claims have been less than $20,000 (New Zealand Treasury, 2015). Recent analysis commissioned by EQC assumes that the expected losses for EQC's land cover – for all perils – will remain less than 10% of EQC's total

average annual loss (New Zealand Treasury, 2017).

Except for severe liquefaction and major landslides, land damage from geological hazards can usually be remediated: volcanic ash can be removed and buckled earth can be levelled. EQC does not protect against erosion caused by slow-onset events or rising seas, but the courts may hold EQC liable for land loss caused by storms – many of which will be more destructive with sea level rise and changes in extreme precipitation. When land disappears with storm surges or flash floods, full compensation may be required. Given the rising value of coastal and riparian land, EQC's exposure could

to differentiate is likely to increase as the cost of estimating individual risk falls with higher-resolution climate models, advanced data aggregation and analysis ('big data') and the expansion of geodata such as LiDAR. Policy discrimination in New Zealand is uncommon and has historically taken the form of higher excesses rather than higher premiums, but this could change.

Impact of insurance retreat on mortgage availability and cost

Insurance is a requirement for residential mortgages in New Zealand and failing to maintain insurance can trigger 'technical' default. The possibility of default is

1993 Earthquake Commission Act, commercial properties are insured only by the private sector insurers. Without the involvement of the public insurer (EQC), the response of commercial policy premiums to the Canterbury earthquakes was more dramatic. The loss of cover for earthquake-prone buildings was more acute in the non-residential sector. It is also likely that some of the other factors that might be dampening the expected increases in premiums on individual residential properties do not apply in the commercial sector, where the full explicit and implicit risk is borne by the insurers.

For commercial properties, insurance plays an additional, socially beneficial role by allowing entrepreneurs and small and medium-size businesses to transfer some of the risks they incur, thus facilitating more investment in future activities and growth. The vast majority of businesses in New Zealand are small, so this risk-transfer role for insurance is potentially very important (though as yet unquantified). Similarly, business continuity insurance contracts are often tied to property insurance, so the potential withdrawal of commercial property insurance will impose cascading barriers on the operations of small and medium-size commercial entities.

> ## As insurance retreats from particular locations, house prices in those areas are likely to be affected and infrastructure investments may be more difficult to justify.

become orders of magnitude greater than historical averages.

Private supply of residential insurance

Insurance covers risks for which there is significant uncertainty. As such, insurers will retreat from coastal and riparian locations once risks are sufficiently probable. Insurers may retreat from a coastal or riparian area of New Zealand following a climate event in that location or in another New Zealand location. Alternatively, they may retreat after their experience in another country convinces them that risk profiles have changed because of sea level rise or other climatic changes. Insurance retreat from coastal and riparian locations could increase the unfunded fiscal risk faced by the Crown and decrease house prices as mortgages become unavailable (or more costly).

Insurers may be more willing to continue to provide insurance to high-risk areas if they decide to discriminate between these areas and lower-risk ones in the policies they offer (in premium prices, in excesses or in policy wording). Pressure

exacerbated by maturity mismatches between residential insurance and mortgages. While mortgages are often granted with repayment periods spanning decades, insurance contracts are renewed annually. Insurers are thus able to leave an insurance market within 12 months, while it may be a decade or more before lenders' loans mature. As a consequence, in the future, bankers may lend to owners of coastal property less often, require more equity as collateral, or offer shorter mortgage terms (Lawrence et al., 2016). Even now, and despite their rules requiring mortgagors to insure, the general absence of compliance checks means that banks do not currently know whether particular properties they mortgage remain insured beyond the first year of ownership.

Commercial insurance

The same problems and trends that we described for insurance for residential buildings and contents[4] also apply to commercial ones; though commercial cover responds to these pressures even faster. In New Zealand, since the

Looking ahead

The landscape for insurance demand and supply is already changing. Insurers are gradually moving away from the New Zealand practice of all-peril policies. They are offering different types of maximum cover for different hazards, even though this adds complexity to insurance contracts. This may lower demand for disaster insurance from homeowners. A requirement that insurers provide a non-technical explanation of the key elements of the insurance policy on a single page could support homeowners' decision making. Reforms of consumer finance in the United States following the global financial crisis, such as the Credit CARD Act of 2009, provide an example of this type of requirement. A breakdown of the cost component for each category of risk – for example, how much of an insurance premium price covers the risk of fire as opposed to the risk of floods at that

location – could strengthen the signalling effect of insurance. From experience with other policies – for example, mandatory pricing of plastic bags – we know that even very modest pricing signals can have a material impact on behaviour.

As hazards become more likely, and particularly for homes experiencing repeat events, insurers are also transferring some risk back onto homeowners by requiring very high excesses. Insurers are already withdrawing from some individual flood- and earthquake-prone properties. Policymakers are limited in their ability to determine the extent of this problem, as private insurers do not disclose their commercial decisions regarding insurance availability. As climate hazards escalate, these trends will accelerate. In some jurisdictions, the insurance regulator collects information from insurers on insurance coverage (Plitt and Maldonado, 2012). Aggregated data from insurers on key contractual terms, including premium pricing and excess levels, and expected and actual losses, as well as notification of withdrawal of coverage from particular locations, could be very useful for policymakers in assessing emerging risks.

Insurance, which has long contributed to the financial security of homeowners and supported economic growth, will become less available. As insurance retreats from particular locations, house prices in those areas are likely to be affected and infrastructure investments may be more difficult to justify. Since insurance companies are unlikely to commit to long-term insurance contracts, local and central governments will need to commission their own analysis of the potential timing and scale of insurance retreat from locations affected by climate change hazards.

Furthermore, the New Zealand government's fiscal exposure will expand as the government faces ever greater pressure to respond to climate disasters with financial assistance and other post-event recovery support programmes. Creation of innovative funding instruments that support pre-event adaptation measures that enhance societal resilience and reduce risk could lessen these claims on central and local government when disasters occur (Boston and Lawrence, 2017).

Since climate change will render some currently inhabitable locations uninhabitable, policy interventions in the insurance market can only achieve so much. Projections of probable insurance retreat could serve as the canary in the coal mine, and inform decisions to gradually withdraw residential properties from those locations most at risk from climate change.

1 Economists, with their talent for esoteric terminology, call this myopia 'hyperbolic discounting'.
2 *Quake Outcasts v the minister of Canterbury earthquake recovery* [2017], NZCA 332 (1 August 2017).
3 EQC land liability is the smallest of: the area of the insured land that is damaged; the minimum-sized area allowed for use of a residential site under the relevant district plan; the value of the 4,000m2 closest to the dwelling (New Zealand Treasury, 2015).
4 Note: since private insurers do not provide cover for land damage, and EQC does not provide cover for commercial properties, no insurance is available for land damage on commercial properties.

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Festive greetings from the School of Government

School of Government

The School of Government would like to extend our sincere thanks and good wishes to all those who had contact with the School during 2017, with particular acknowledgement of our 2017 graduands and prize-winners.

We wish you all a happy and restful festive season and look forward to working with you all again in 2018.

Graduate Pathway Students: Three Contributions

The School of Government at Victoria University of Wellington each year accepts a small number of promising undergraduates into its Professional Masters programmes. They undertake an accelerated programme that involves a for-credit short internship. In this issue of *Policy Quarterly* we feature short articles by three students – Alice Denne, Matthew Macfarlane and Danijela Tavich – based on their internship research. The students had highly varied experiences ranging from supporting a social enterprise in its work with contractors to government, researching productivity with the Productivity Commission, and exploring covenanted land and sustainability for the Waipā District Council. We are very proud of our excellent Graduate Pathway students and look forward to their graduation this December.

Dr Barbara Allen, *Graduate Pathway Coordinator*

Alice Denne

Lessons from an Internship at Waipā District Council motivations and incentives

Creating change through policy interventions relies most often on changing individuals' behaviour. To create effective change, it is important for policymakers to understand the attitudes and motivations of the people most affected. I learned how important this is while spending my summer interning at the Waipā District Council in Waikato as part of Victoria University's Master of Public Policy graduate pathway programme.

Isolated from the rest of the world, New Zealand is home to much indigenous natural heritage. The rise of agriculture and suburban living has dramatically reduced the dense native bush that covered most of the country just 200 years ago. The Waipā district is not exempt from this trend and, as a farming region, now all but 7.5% of the district's land has been cleared. It is home to 73 nationally threatened species, including kahikatea, tawa and podocarp forest, kānuka shrub and species of bat and gecko (Kessels & Associates Ltd, 2013).

As a local authority the district council must work to prevent further destruction of the heritage that remains. The Resource Management Act 1991 (RMA) requires territorial authorities to protect 'areas of significant indigenous vegetation and significant habitats of indigenous fauna', while preventing inappropriate land use, subdivision and destruction (s6(c); Waipā District Council, 2010). The challenge is that the most vulnerable land and many threatened ecosystems are found on private property, outside council authority. In

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order to meet biodiversity goals, the efforts of landowners to protect and maintain the quality of the environment that surrounds them is essential. Limited in their ability to monitor or enforce regulatory measures, the councils' role is then to encourage landowners to protect their own natural heritage sites.

Natural heritage covenants are promoted as an effective way to ensure the ongoing existence of threatened species on private land otherwise vulnerable to destruction. Covenants prevent both current and any future title holders from removing the heritage feature and are administered by either the Queen

be divided into two camps: those who farmed for money and economic gains, and those who farmed for the lifestyle, driven by stewardship values to care for the environment (Scarlett, 2004; Sullivan et al., 1996; Taylor, Cocklin and Brown, 2011; Maybery, Crase and Gullifer, 2005).

These motivations were consistent with what I found in the Waipā district: four of the six landowners were protecting their natural heritage because they cared about the environment. They talked about being motivated by the knowledge that they were leaving something behind for future generations and felt a responsibility to protect what was left.

plant the land, their ecological benefit will be minimal. For this reason, not only are the covenants important, but it is also important for landowners to have a stewardship attitude towards their land and be motivated to look after it. Hence, the current policy is not doing enough to change the attitude and behaviour of landowners unwilling to protect natural heritage and threatened species.

Some interviewees talked about neighbours who saw covenants as 'black marks on the landscape' and thought that maximising the agricultural potential of land was always more important than protecting bush. It is these attitudes that need changing to prevent the further destruction of the district's natural heritage. Awarding subdivision entitlements to those unwilling to maintain their heritage sites brings few benefits to the region, and at the cost of undermining the district's rural growth strategy. The strategy aims to reduce ad hoc rural development created by these unplanned residential lots scattered between towns.

This study taught me the importance of knowing the people whose behaviour you are seeking to change and understanding their motivations.

Elizabeth II National Trust or the council. In the Waipā, landowners are incentivised to use covenants by being offered a subdivision entitlement in exchange. These can be used on another section of their land or sold to another property within the district. This creates a financial benefit to compensate for the loss of potential economic value the land had prior to covenanting.

To better meet the requirements of the RMA, the council sought to evaluate the effectiveness of this scheme. I wanted to know how people were responding. Was this incentive attractive to landowners? Were farmers interested in covenanting their land, which often comes with costly management plans on top of loss of property rights, for the economic benefit of a subdivision? Or was there another, more important motivator for seeking covenant status?

My exploratory study was centred on interviews with landowners who already had covenants on their properties. Altogether, I conducted seven exploratory interviews in early 2017, six with landowners and one with a local property valuer. Existing literature suggested that the farmers and their motivations, broadly speaking, could

For the environmentally motivated farmers, the subdivision entitlement was a reward for the work they were already doing on their property, not an incentivising factor to apply for covenant status. The legal protection a covenant provides is not enough to ensure ongoing protection of threatened species; many sites require fencing, riparian margin planting, and ongoing weeding and pest control. Before a covenant is created, landowners are made aware of the management required and are able to make a decision on whether this ongoing cost is worthwhile. Even with a covenant, without the effort, time and financial investment of landowners maintaining their sites, the preservation of natural heritage would be lessened by uncontrolled weeds and pests.

The two farmers who were motivated primarily by the economic value of the entitlement claimed that their sites required very little, if any, maintenance. Neither was motivated to protect the environment in their care.

As they provide ongoing legal protection, natural heritage covenants are essential for the long-term preservation of biodiversity. But without the effort of individuals to weed, control pests and

As it stands, the current incentive offered by the Waipā District Council reaches the low-hanging fruit, mostly those individuals already motivated by stewardship values to restore the natural environment in their care. The financial incentive is not great enough to overcome the loss of property rights or compensate for the ongoing work that must be done by farmers. It is not easy to see the degeneration of natural environments that happens gradually over generations. The council should increase awareness of the issue of biodiversity loss in the district. It needs to inform people of what they can look for as indications of this on their own land and highlight what changes they should be concerned about in their waterways, soils and visible landscape.

After awareness is increased, the strategies the council uses to reduce the effects and prevent further damage can be better communicated. I suggest that there should be greater awareness of the biodiversity corridor strategies and protection for significant natural areas, and why these are important priorities for the district. Support can be built through profiling the environmental work already

being undertaken by role models and champions in the community. Greater benefits will be achieved if social norms regarding land use and the environment can change.

Yet changing attitudes alone will be ineffective when significant barriers still exist. I recommend that the council tries to better understand the specific barriers faced by Waipā residents who may intend to act pro-environmentally but are limited in their capacity to do so. I found that barriers are both financial and related to capacity, skill and time. These can be reduced by profiling external funders, community restoration projects, and increasing education about what landowners can do to restore natural heritage on their own properties (Steg and Vlek, 2008; Taylor, Cocklin and Brown, 2011).

This study taught me the importance of knowing the people whose behaviour you are seeking to change and understanding their motivations. It is easy for policymakers to make inaccurate assumptions and then design policies that miss the mark because of this. Policy is about people: it is about their values and motives and the way they respond to incentives, sanctions and barriers. Policymakers do not know everything and must often make decisions based on limited information. But it is important to engage with those most affected by the policy and develop a better understanding of their motivations and barriers to change.

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Matthew Macfarlane

Two Key Lessons from a Public Sector Internship
accountability in public sector contracting and client-level data

I served as a research intern for the Ākina Foundation through the School of Government's graduate pathway programme during the summer of 2016-17. Ākina, which is dedicated to fostering social enterprise in New Zealand, was contracted by the Ministry

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of Social Development (MSD) to facilitate and manage the co-design and implementation of its Acceleration for Results programme (Ākina Foundation, 2017). This programme seeks to transition the providers with MSD contracts from output-based contracts (i.e. purchase agreements) to results-based contracts (i.e. contracts which specify desired changes in recipients' quality of life according to prescribed measures). The new contracts are intended to assist MSD in reaching its Better Public Services (Ministry of Social Development, 2015) targets by measuring (and incentivising) provider performance based on client

The following reflections focus on two specific issues raised by the new policy: first, the implications of the new form of contracting for accountability; and second, the privacy issues that have arisen as a result of the desire of policymakers, in the interests of more effective interventions, to acquire greater client-level data from social service providers via the new contracting regime.

The impact on accountability
When government programmes are contracted out, the tasks to be undertaken are carefully defined at the outset so that both parties have matching expectations.

specifically in a contract; their other accountabilities are only those set out by their individual organisation (e.g. in codes of conduct) or their professional standards.

This is a problem because public resources are expended by organisations not covered by the State Sector Act. Aside from each organisation's professional practices, and what is outlined in their respective contracts, non-governmental organizations (NGOs) are not obliged to act like public sector agencies. For instance, they are not responsible for providing free and frank advice to ministers; they are not obliged to serve the government's wider objectives, such as stewardship; and they are not required to contribute to the objectives of public agencies with which they do not have contracts. Hence, contracting out presents a structural risk in the design and implementation of public policy in New Zealand. One example in the social investment space is that there is no mechanism for NGOs to account for the benefits which accrue to departments they are not contracted with. For example, an NGO contracted to the Ministry of Social Development has no incentive to create savings for the Department of Corrections other than what may be stipulated in a specific contract. By contrast, a public servant working in MSD is ultimately accountable to cabinet (in hierarchical terms) and therefore has a responsibility to consider the wider public interest.

Structural risks necessitate structural solutions. One way forward would be to place an additional responsibility on public servants to ensure that contractors provide ongoing feedback on how their activities might contribute to wider governmental objectives. This implies strong relational contracting, with regular interactions between those tasked with commissioning and those responsible for delivering publicly funded services. A key goal must be to ensure that departments cannot contract away their responsibilities to be good stewards of public resources.

Individual client-level data
Individual client-level data is, as defined by MSD, 'information about a client that typically doesn't change over time and

> … one of the risks of contracting out the provision of publicly funded services via tightly defined contracts is that NGOs focus narrowly on the terms of the contract, potentially at the expense of wider public goals.

outcomes, rather than directly purchasing services from providers.

During my involvement the policy programme was at a pilot implementation stage. That is to say, there was a small sample of social service providers working with MSD and Ākina to understand the goals of the policy, identify barriers to change from the perspective of both MSD and providers, and iteratively design some prototype contracts. Approximately 20 providers were involved across the four workshops I attended, and about 15 MSD staff from regional and central offices.

My role for Ākina was to observe the processes and context specific to the new contracting policy, and to conduct an independent literature review. From these I prepared recommendations that highlighted international practices and potential risks. The project also involved some rapid processing of data from workshops and surveys to assess provider readiness, mood, and satisfaction with the early implementation stages of the policy.

This creates a client–provider relationship dynamic, and enables providers to be held to account for their performance. These features have an impact on both the design and the implementation of the policy, because the relationship of a client to a provider is different from that of a department or ministry to a minister.

Public servants juggle difficult, sometimes conflicting accountabilities – to their line managers and chief executives, to the government of the day and the individual minister, and to their stakeholders – alongside responsibilities to be good stewards of resources and to maintain political neutrality. Public servants are offered tools to navigate these accountabilities: the State Sector Act, the code of conduct for the state services, and other resources, written and unwritten, including constitutional conventions. The accountabilities for non-government entities working on government programmes are different. The bulk of their accountabilities are outlined

is identifiable by its nature' (Ministry of Social Development, 2017). This includes information such as names, ages and locations, as well as what services clients are accessing. Here I briefly outline the key controversies that have become the subject of media attention (Brunton, 2017; Kirk, 2017) and a report from the privacy commissioner (Privacy Commissioner, 2017). These arose during my internship as the collection of individual client-level data was (at that time) to be included in every new contract. The opportunity for first-hand exploration of the issues was personally exciting.

Concerns surround both privacy as something intrinsically valuable, and the potential consequences of a client's unwillingness to consent to providing personal data – such as reduced trust in providers or choosing not to use services they would benefit from, thereby incurring harm. In the workshops I attended providers were almost uniformly opposed to the collection of individual client-level data. The privacy commissioner reports that anecdotally around half of providers have clients who would be unwilling to release their personal data.

However, some providers also reported that their clients were largely unconcerned, or at least were willing to trade privacy for the promise of 'better' outcomes. Even so, these providers were unwilling to support the government's proposals. This raises questions about whether it is right ethically for providers to adopt a paternalistic approach to their clients, and conversely whether it is justified for the government to use its coercive powers and funding mechanisms to compel organisations to release this required information.

The willingness of some clients to sacrifice their privacy for a better quality service aligns with the view that privacy is a luxury good (Trepte and Reinecke, 2011; Angwin, 2014) that can be traded away for something individual clients value more highly. The question of whether people, especially vulnerable people reliant upon social services, should be *compelled* to exchange privacy for the services they need raises significant ethical issues. Much depends on the value placed on individual privacy and the extent to which less privacy is likely to enhance the achievement of other important societal goals. For those who value privacy highly, there will need to be powerful reasons for trading even modest amounts of it away.

Concluding remarks

My experience as an intern brought to the fore critical issues of governance. One of these relates to the risks associated with governments contracting out the design of public policy. Another concerns the practice of contracting with NGOs for the provision of services. In both cases, important issues of accountability arise. More specifically, one of the risks of contracting out the provision of publicly funded services via tightly defined contracts is that NGOs focus narrowly on the terms of the contract, potentially at the expense of wider public goals. Another concern is that government departments are unable to fulfil their responsibilities to be good stewards of public resources and their capacity to pursue wider government objectives is diminished. At the same time, it will be important in an age of big data and the unequal distribution of personal privacy and material resources that governmental contracts with NGOs do not impose unjustified demands for personal information.

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Danijela Tavich

New Zealand Productivity Commission Internship
social sector productivity

For my internship I prepared a short paper on social sector productivity for the Productivity Commission. The objective was to consider the implications of introducing productivity measurement in the social sector, given some of the complexities of observing outputs and outcomes for certain sector tasks. To do this I selected one typology, James Q. Wilson's matrix of government tasks in Gregory (1995b), and attempted to apply this to a set of tasks within one organisation in the social sector, namely the Ministry of Social Development (MSD). The tasks were drawn from MSD's annual report for 2015/16.

Productivity in the social sector

The social sector is complex, covering a variety of activities, including health, education and welfare services. Productivity measures the capacity of an economy, industry or organisation to produce goods and services (outputs) using inputs such as labour and capital (such as machinery, computer software and land). It is a quantitative measure of the ratio of the volume of output to the volume of inputs (Gemmell, Nolan and Scobie, 2017). Productivity is a useful concept in the social sector because delivering more or improved services with the same inputs (or the same services with fewer inputs) can potentially enhance well-being, all else being equal (Conway, 2016).

An important component of productivity measurement is quality adjustment, which ensures that quality changes are considered when measuring productivity, to ensure a fair picture of performance and minimise the promotion of productivity improvements at the expense of quality (Hanushek and Ettema, 2015). Consequently, to be able to apply standard productivity measures to social sector tasks we must be able to observe some defined input, and the output or outcome, and we must be able to quality-adjust the result.
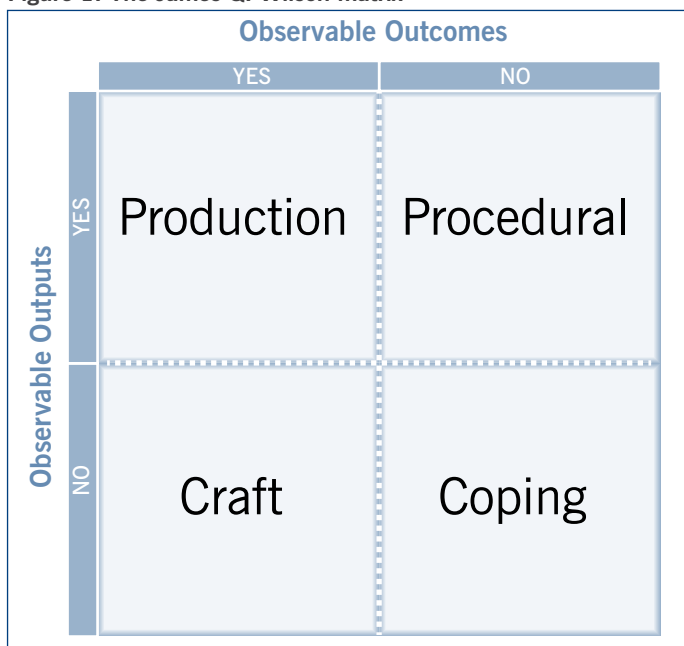
Theory

Wilson's typology differentiates among types of tasks by the observability of outputs and outcomes, and identifies four categories, as shown in Figure 1. Production tasks have observable outputs and outcomes; procedural ones have observable outputs but outcomes that are difficult to observe; craft ones have observable outcomes but outputs are difficult to observe; and it is difficult to observe both outputs and outcomes of coping tasks (Gregory, 1995a).

Wilson's typology, and this analysis, employ a broad definition of outputs as the work that organisations carry out and the things (goods and services) produced, and outcomes as the effects of this work
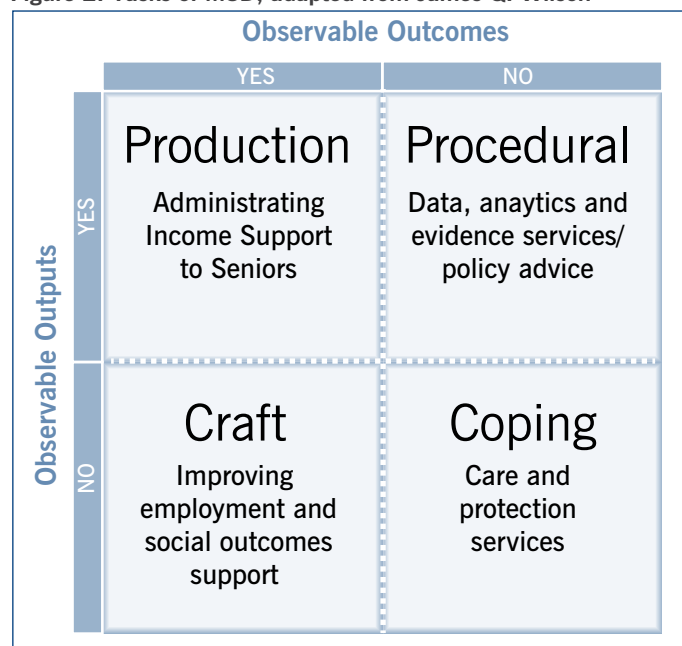
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Figure 1: The James Q. Wilson matrix

Observable Outcomes

	YES	NO
YES	Production	Procedural
NO	Craft	Coping

Observable Outputs

Figure 2: Tasks of MSD, adapted from James Q. Wilson

Observable Outcomes

	YES	NO
YES	Production — Administrating Income Support to Seniors	Procedural — Data, anaytics and evidence services/ policy advice
NO	Craft — Improving employment and social outcomes support	Coping — Care and protection services

Observable Outputs

on communities and society at large (Gregory and Lonti, 2008). However, outputs and outcomes can be further broken down according to the level at which we wish to observe them, a point which will be returned to later.

Practice

Performance measurement practice in the social sector is governed by the requirements of the Public Finance Act 1989, which, in contrast to Wilson's typology, considers all organisations to be based on production-type tasks, with observable outputs and outcomes (Gregory, 1995b; Treasury, 2005). For many years the government has tried to shift performance measurement in the social sector to an outcomes focus (Destremau and Wilson, 2016, p.33). However, it can be difficult to observe (and, consequently, to measure) some outcomes, particularly those that only become evident in the long term (Alford 1993; Productivity Commission, 2015).

Further, co-production can cause issues for measuring some social sector tasks. Co-production entails the contribution of people or organisations external to the producing organisation (such as the target group being regulated, or other public actors) to accomplish objectives (Alford, 1993). Co-production is usually required for more complex tasks, namely craft and coping tasks, and

can cause significant issues for attributing outcomes to a single organisation by making it hard to unpick the causes and effects of contributing efforts (Gregory, 1995b). As craft tasks have some observable outcomes, the effects of co-production are slightly less significant for measurement, as there is some observable end which can be linked with production technologies (technical knowledge). However, in the case of coping tasks this matter can be challenging (ibid.). Nevertheless, much measurement already exists in the social sector, including for tasks which have complex, long-term goals, such as social work (see Ministry of Social Development, 2016).

Key findings

Limits of the typology

There are some clear limitations to Wilson's typology when applying it to practice. Indeed, Wilson himself once warned that the typology should be used 'with caution' (1989, p.159). Significantly, the attempt to categorise many complex tasks into a small number of categories – in this case four – is unduly restrictive (Lonti and Gregory, 2007). The exercise of applying Wilson's approach to the services undertaken by MSD (see Figures 2 and 3) illustrated this, and the lines between quadrants in Figure 2 have been dashed to represent that the classifications are not definitive.

In some instances, a classification that would allow a task to straddle the lines between quadrants might be most appropriate. For example, certain tasks can have sub-tasks that are more or less observable. For instance, fraud prevention is a sub-task of administering income support to seniors (Ministry of Social Development, 2015). Fraud prevention requires more discretion on the part of officials and thus is more difficult to observe and might not fit within the production quadrant. Nonetheless, other tasks fit relatively neatly within the typology, with care and protection services (social work) a clear coping task.

One-size-fits-all approach not sufficient

Despite the limitations, applying the typology to MSD highlighted that much task diversity exists within a single social sector organisation, as shown in Figure 2. This indicates that a one-size-fits-all approach would be inappropriate for productivity measures in the sector. Inevitably, the measurement of a coping task like social work will require a different approach from that required by a production task like processing payments (Gregory, 1995a). In these more complex cases, moving away from standard productivity measures and towards productivity-type measures, such as cost-effectiveness (i.e. measuring the relationship between inputs and final

Figure 3 The reliance of tasks on co-production
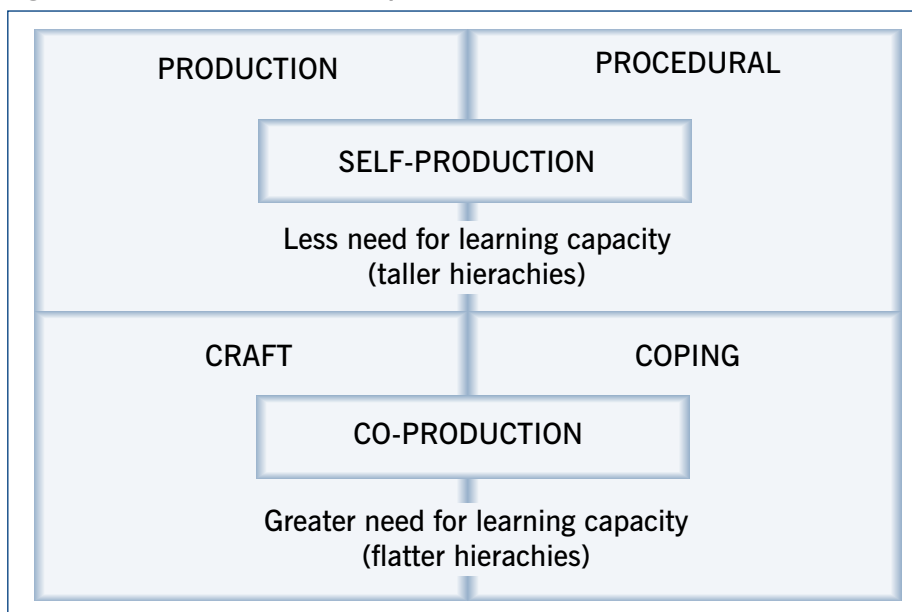
Source: Gregory, 1995a, p.174

outcomes) and more innovative bespoke measures or proxies, might be most appropriate.

Defining levels of measurement
The way we define outputs and outcomes affects how we might go about measuring them. Wilson's typology employs a broad definition of outputs and outcomes, but these can be further broken down according to the level at which we wish to observe them. Outputs can be observed either at the level of the specific day-to-day activities of individuals (as Wilson

suggests), or at a higher-level overview of this work, such as the number of hours worked or the number of children seen in the case of a social worker (see Laking, 2008). Similarly, outcomes can be broken down into intermediate outcomes and ultimate outcomes, the former being more observable, shorter-term goals and the latter being the final desired effect of the task, which could take years to eventuate and is more consistent with Wilson's definitions (Coglianese 2012; Gregory 1995a).

There is a need for greater clarity about what we mean when we refer to outputs and outcomes, as using the same words interchangeably can create confusion, not least when exploring performance measurement issues. Certainly, it will be easier to observe a higher-level overview of an output, and an intermediate outcome, than it would be to observe outputs and outcomes according to Wilson's definitions, and the former set of definitions are more consistent with those employed in the Public Finance Act 1989. Nevertheless, which level of measurement is appropriate depends on the objective – what it is that we are trying to achieve or learn by measuring the outputs and outcomes of a certain task – as different goals will require different levels of detail. Approaching measurement in this way will help to avoid 'hitting the target and missing the point' (Bevan and Hood, 2006, p.421).

Conclusions
Wilson's typology is a useful tool that raises interesting questions about social sector productivity measurement. In many cases standard productivity concepts are compatible with social sector tasks. In others, however, we may need to apply more innovative, bespoke methods to capture performance. Above all, it is imperative to define outputs and outcomes clearly and avoid a one-size-

Table 1 Compatibility of selected tasks with productivity concepts

Task type	Inputs (labour and capital)	Outputs	Outcomes	Ability to measure quality change
• Production – Administering income support to seniors	• Capital (money, computers, buildings etc.) • Labour intensive	• Monetary transfers • Entitlement eligibility assessments	• Ability of seniors to maintain independence and social participation	• Using outputs or outcomes
• Procedural – Data, analytics, evidence and policy advice	• Capital (money, computers, buildings etc.) • Labour intensive	• Advice delivered to Minister	• Unobservable – outcome attribution issues, impacts of work uncertain	• Using outputs
• Craft – Improving employment and social outcomes support	• Capital (money, computers, buildings etc.) • Labour intensive • Attributes of clients etc.	• Unobservable – much discretion by officials, difficult to prescribe outputs	• Clients moving closer to independence (away from benefit dependency)	• Using outcomes
• Coping – Care and protection services	• Capital (money, computers, buildings etc.) • Labour intensive • Attributes of clients etc.	• Unobservable – much discretion by officials, difficult to prescribe outputs	• Unobservable – attribution problems, impacts of work uncertain	• Difficult

fits-all approach. Plainly, the social sector is too complex to be fully captured by Wilson's typology, which consequently, as he warned, must be used 'with caution'.

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