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Policy Change as Innovation

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Executive Summary

Natural resource policy is in a continual process of change as policy makers seek ever better ways of achieving environmental objectives. Some changes in policy are incremental refinements while others involve major investments in the development of innovative policy instruments, such as market-based instruments. Given that each organisation will be governed by its' own history, culture, resources and responsibilities, the introduction of a change in natural resource policy can have radically different consequences for different organisations. We suggest that the process of formulating and implementing changes in natural resource policy instruments would be more effective if the organisations involved had better insights into the differences between them. Further, we believe that the specialist literature on product innovation within the field of organisational management may provide such insights.

Within the product innovation literature there are a number of studies that categorise product innovations into different types based on the nature and extent of change the innovation entails for the organisation developing the innovation. These studies have shown that different organisational capabilities are required to successfully adopt each type of innovation. In this paper we have drawn mainly from Henderson & Clark's (1990) framework for categorising innovations into modular, incremental, architectural or radical types depending on the degree of change an innovation introduces in the components and architecture of a product.

We believe that policy instruments can be seen as different types of products that are adopted by organisations such as government departments and agencies. Innovations in policy instruments can be seen as a type of product innovation. We also believe that, as is the case with product innovations, the development and adoption of innovations in policy instruments involves the application of new knowledge. This implies the development and adoption of innovative policy instruments creates a need to develop new organisational skills and capabilities, as is the case with product innovations.

We adapt Henderson & Clark's (1990) framework for classifying innovations to characterise different types of change in natural resource policy instruments. Innovations in policy instruments are classified into one of the four types of innovation based on the magnitude of change the innovation introduces to the components and architecture of the policy instrument. The components of a policy instrument are the documented rules, processes and procedures that

perform a certain function. Components are underpinned by a set of component principles, which are the fundamental ideas that guide the design of that component, and how it achieves its function. The architecture of a policy instrument is the way that the components of the instrument are arranged or integrated to form different types of policy instruments such as regulations or incentives. The architecture of a policy instrument is guided by architectural principles, which are the fundamental ideas that underpin the arrangement of components to form the policy instrument and guide how the policy instrument is designed to achieve the policy objective.

An incremental innovation is a change that does not change any of the fundamental component or architectural principles of the policy instrument. The change is consistent with the existing instrument and is unlikely to have a disruptive impact on the organisation. A modular innovation is a change in component principles without altering the architectural principles. This type of innovation is likely to require the development of new skills and processes though these disruptions are likely to be contained along component-related, functional lines. An architectural innovation is a change in the architectural principles of the instrument that leaves the components of the instrument largely unchanged. This type of change can be competency destroying so may cause disruptions across the organisation. A radical innovation is a revolutionary change that changes the fundamental component and architectural principles of a policy instrument. This type of change creates a completely different policy instrument that fundamentally departs from the design of the current policy instrument. As such, this type of change is likely to be extremely organisationally disruptive and require the development of new capabilities and changes to structures and processes.

The four types of innovation represent a continuum of change for organisations. Each type impacts on organisations differently as they provoke differing degrees of change for organisational competencies, values, roles, responsibilities and structure. By understanding what type of innovation a change in policy instrument may be we are better able to explore and anticipate the organisational consequences of changes in policy instruments for government agencies. We believe that such a framework can provide new insights into the issues government faces in introducing changes in policy instruments.

We plan to apply the policy innovation framework presented here to case studies in natural resource policy in Victoria and New Zealand to further explore the implications that this framework has for the implementation of natural resource policy.

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1. Introduction

Natural resource policy is in a continual process of change as policy makers seek ever better ways of achieving environmental objectives in regard to water quality, salinity, nutrient run-off and biodiversity. Some changes in policy are incremental refinements, others involve major investments in the development of innovative policy instruments, such as market-based instruments. The Victorian State Government is particularly interested in promoting the considered application of novel policy instruments to increase the rate of progress towards achieving its' environmental and economic objectives, and to demonstrate the impact of government policy in a more transparent and accountable way.

The originality of these instruments, combined with the complexity of the institutional environment into which they are being introduced, means choosing and implementing the right mix of instruments are challenging tasks. This is especially the case in natural resource management because responsibility for achieving environmental objectives is spread among a range of organisations. This means that successful implementation of any changes in policy require agreement between, and coordination among, a number of organisations. Given that each organisation will be governed by its' own history, culture, resources and responsibilities, the introduction of a change in natural resource policy can have radically different consequences for different organisations. We suggest that the process of formulating and implementing changes in natural resource policy instruments would be more effective if the organisations involved had better insights into the differences between them. We believe the management literature on product innovation may provide such insights.

There is a substantial body of research within the field of organisational management that has focused on categorising product and process innovations. Typically, innovations are categorised into types according to the nature and extent of change the innovation entails for the organisation developing the innovation. Consequently, each type of innovation requires different organisational capabilities for its successful adoption.

We are proposing in this paper that policy instruments can be viewed as products and that innovations in policy instruments can be viewed as a kind of product innovation. We are also proposing that, as is the case with product innovations, the development and adoption of innovations in policy instruments involves the application of new knowledge. This implies the

development and adoption of innovative policy instruments creates a need to develop new organisational skills and capabilities, as is the case with product innovations. We hypothesise that innovations in policy instruments can be categorised into different types using principles that are similar to those that are used to categorise innovations in products. By classifying changes in policy instruments into different types of policy innovation we hope to create a framework for exploring and anticipating the organisational consequences of changes in policy instruments for government agencies. We believe that such a framework will provide new insights into the issues that government faces in introducing changes in policy instruments.

We aim to show that by applying the framework to the adoption and implementation of policy instruments we will be able to:

- develop guidelines for classifying policy instruments according to the type of innovation they represent
- identify the implications for organisational change of different types of policy innovations

In section two we describe a framework for categorising product innovations into different types and outline the organisational implications of each type. In section three we adapt this framework for application to policy instruments used in natural resource management and discuss the implications of this application. Finally, we conclude in section four with a summary and our thoughts on future directions for this research.

2. Conceptual Framework

The field of innovation research in organisational management is an area of study that explores the impact on organisations of different types of change associated with the introduction of innovations into organisations. A distinction is often made in innovation research between product or technological innovation, behavioural or organisational innovation, and process innovation. Each of these has its' own specialist literature. This paper draws on the specialist literature on product or technological innovation to draw insights for natural resource policy.

Product, or technological, innovation is defined as novelty in the capabilities and knowledge that makes up a product or technology (Smith 2000). In the literature on product innovation there are a number of studies that categorise product innovations into different types and then consider the different organisational capabilities that are required to successfully adopt each type (Abernathy

and Clark 1985; Afuah and Bahram 1995; Dewar and Dutton 1986; Ettlie, Bridges, and O'Keefe 1984; Gatignon, Tushman, Smith and Anderson 2002; Henderson and Clark 1990). In this paper we have drawn mainly from Henderson and Clark's (1990) categorisation of innovations into four types depending on the degree of change an innovation introduces in the components and architecture of a product. Before describing their four types, we will consider the basis for their categorisation in some detail, namely change in product components and product architecture.

2.1 Product components and architecture

Henderson and Clark (1990, p10) define the components of a product as the physically distinct parts of the product and the core design concepts associated with these parts. Core design concepts embody the knowledge and functions of the component while the actual component is the physical implementation of the design concept. Specific areas of knowledge are developed around product components and their functions (Henderson et al 1990). They use the example of a pedestal room fan to illustrate the idea of a product component. The major components of the fan include the blade, the motor that drives it, the blade guard, the control system, and the mechanical housing (Henderson et al 1990, p10).

Product architecture describes the way the components are arranged or integrated to form the product as a whole (Henderson et al 1990, p10). In other words, the architecture of a product reflects the product concept and describes the way components are linked together to make the concept a reality. As with product components, specialised knowledge develops around a product's architecture (Henderson et al 1990). Continuing with the example of a pedestal room fan, the architecture is the way that the fan components are linked together to create a portable system for moving air in a room (Henderson et al 1990). The architecture of a free standing room fan is different to that of a fixed, ceiling fan. Both have similar components but the components are arranged differently to form each type of fan, thereby creating different products. The architecture of each type of fan requires different knowledge and skills.

Architectural knowledge becomes embedded in the organisation through its communication channels, information filters and problem solving methods (Henderson et al 1990, p13). For example, communication channels form around key tasks and processes over time as these tasks and processes become routine. Information filters develop to mould challenging information into familiar patterns. Experience can lead to unthinking reliance on proven methods of problem

solving at the expense of developing new methods for new situations (Henderson et al 1990, p13). This means that a change in the architecture of a product can have quite disruptive affects on these three areas in the organisation. Given the architecture of a free standing room fan is different to that of a ceiling fan, the manufacture of each type of fan requires different routines and processes as well as different knowledge and skills. The differences in turn generate differences in the communication channels, information filters and problem solving methods associated with the manufacture of each type of fan.

In principle, unique knowledge, skills and processes may be embodied in the components as well as the architecture of products. Consequently, a change in either may provoke changes in the capabilities of the manufacturing organisation (Henderson et al 1990).

2.2 Types of innovations

The degree of change that the innovation requires of the existing dominant design of the components and architecture of a product is used to distinguish between different types of innovations (Henderson et al 1990). A minor change is one that alters only one aspect of the design of a product component or the product architecture. A major change alters many aspects of the design of a product component or the product architecture. A major change represents a significant shift away from the existing dominant design of a product component or architecture to a new design.

A major change involves changing the design concepts (core feature or element) embodied in the components or architecture of the product (Henderson et al 1990). Dominant designs are the core design concepts of a product that emerge from a period of intense experimentation (Henderson et al 1990; Tushman and Anderson 1986). These concepts correspond to major functions performed by the product and are not revisited in subsequent design reviews (Anderson and Tushman 1990; Henderson et al 1990). The establishment of a dominant product design signals a period of stability in product development and the consequent formation of organisational structures, processes and knowledge around these designs (Anderson et al 1990; Abernathy and Utterback 1978; Henderson et al 1990). This process makes any subsequent significant change in design potentially disruptive to the organisation (Henderson et al 1990).

Henderson and Clark (1990) used the magnitude of change that the innovation entails to the components or architecture of a product to identify four types of innovation: incremental, modular, architectural and radical. Incremental innovations entailed minor changes in architecture and components. A major change in a product component with only minor changes to product architecture defined a modular change. A major change in the product architecture with only minor changes in the components represented an architectural change. Finally, a radical change involves major changes to both product components and product architecture. The four types of innovation are represented in figure one.

Incremental innovations are refinements or improvements to an existing, established and dominant product design (Gatignon et al 2002; Henderson et al 1990). They are evolutionary innovations that involve relatively minor changes to the design of product components or architecture. The core design concepts and knowledge required to develop the product components and architecture remains basically the same (Henderson et al 1990). As such, incremental innovations build on the existing knowledge, procedures and core competencies of an organisation (Abernathy et al 1985; Henderson et al 1990).

Although an incremental innovation does not entail major advances in knowledge, incremental innovation may require the acquisition of some new skills or knowledge within the organisation. These new skills and knowledge build on the existing competencies of the organisation (Gatignon et al 2002). Hence, incremental innovations are often described as competence enhancing (Henderson et al 1990). An example of an incremental innovation would be minor changes to the length of a ceiling fan blade or changing the grill design on the guard of a pedestal fan.

Modular innovations involve significant changes to the design of product components and the concepts underlying the established designs for those components (Henderson et al 1990). As this type of innovation does not involve major changes to the architecture of a product, modular innovation requires the incorporation of new knowledge about components into the existing product design. Modular innovations can challenge organisational competencies and knowledge that are specific to components. This may have disruptive effects across the organisation (Anderson et al 1990). An example of a modular innovation would be changing the energy source of a ceiling fan.

Architectural innovations are those that involve major changes in the way that the components of a product are integrated to form the product, that is, major changes to the architecture of the product. However, the core design concepts embodied in the product components remain unchanged for the most part (Gatignon et al 2002; Henderson et al 1990). In other words, an architectural innovation arranges the components of the original product in a fundamentally different way to create a product that differs in concept from the original.

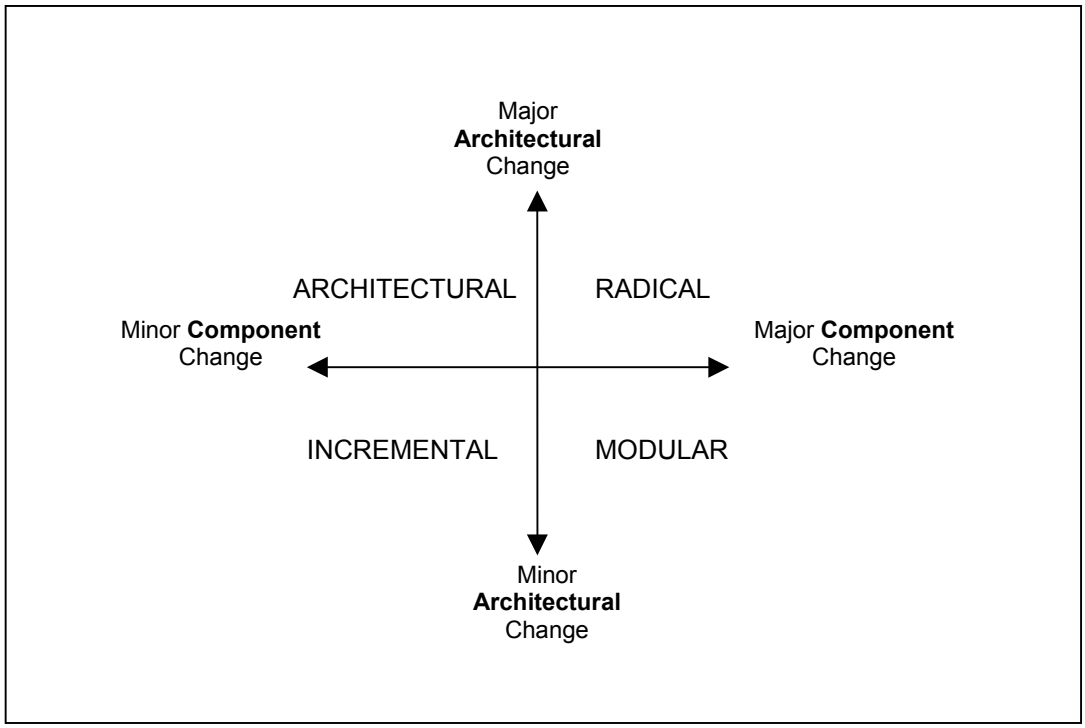

Figure 1. The four types of innovation
(Henderson and Clark 1990)

Architectural innovations may preserve the usefulness of knowledge related to product components while destroying some areas of architectural knowledge (Gatignon et al 2002; Henderson et al 1990).

The change from a ceiling to a pedestal fan is an architectural innovation. The components of the pedestal fan are similar those of a ceiling fan, they both have blades, guards, a power source and so on. However, the components of a pedestal fan are arranged quite differently from those of a ceiling fan. The differences in the architecture of the two products reflect fundamental differences in their respective product concepts.

Architectural knowledge becomes embedded in the organisation as processes and structures develop around the routine interactions within the organisation that are critical to the task of designing and producing the product (Henderson et al 1990). Architectural knowledge includes the knowledge and skills that are incorporated in the organisational norms that develop over time from the repetition of common tasks. As such, architectural knowledge becomes embedded in the procedures and structure of the organisation (Henderson et al 1990). This means that in addition to requiring change to existing organisational capabilities, an architectural innovation may challenge existing procedures or structures (Gatignon et al 2002; Henderson et al 1990). Hence, architectural innovations are often very disruptive for organisations. Such innovations can provoke changes that are difficult to identify by those within the organisation and often leads to a cascade of change throughout the organisation (Henderson et al 1990).

Radical innovations involve major changes to both the components and architecture of a product. They are revolutionary innovations that introduce new product design concepts that depart significantly from the original component and architectural designs. Radical innovations overturn the current dominant product design and render existing technologies obsolete (Abernathy et al 1985; Gatignon et al 2002, Henderson et al 1990). Due to the magnitude of change a radical innovation represents, this type of innovation generally renders many areas of organisational competence and knowledge irrelevant. Hence, radical innovations are often termed competency destroying (Abernathy et al 1985; Henderson et al 1990). The degree of organisational disruption may be so complete as to require the development of entirely new organisational structures and procedures to produce the radical innovation as well as new ways of thinking that may challenge organisational values (Smith 2000).

The change from a ceiling fan to an air-conditioning system would be an example of a radical innovation. The purpose of both products is largely the same (that is, cooling a room) but the product concepts, their architecture and their components are radically different. Air conditioning systems include, for example, refrigeration units as components with architecture developed around this fundamental technology. Much of the knowledge, skills, processes and routines about ceiling fan components and architecture are irrelevant to the development of an air conditioning system. Therefore, the manufacture of air conditioning systems entails different organisational skills, knowledge, procedures and possibly structures to those entailed in the manufacture of ceiling fans. Examples of the four types of innovation are illustrated in figure two.

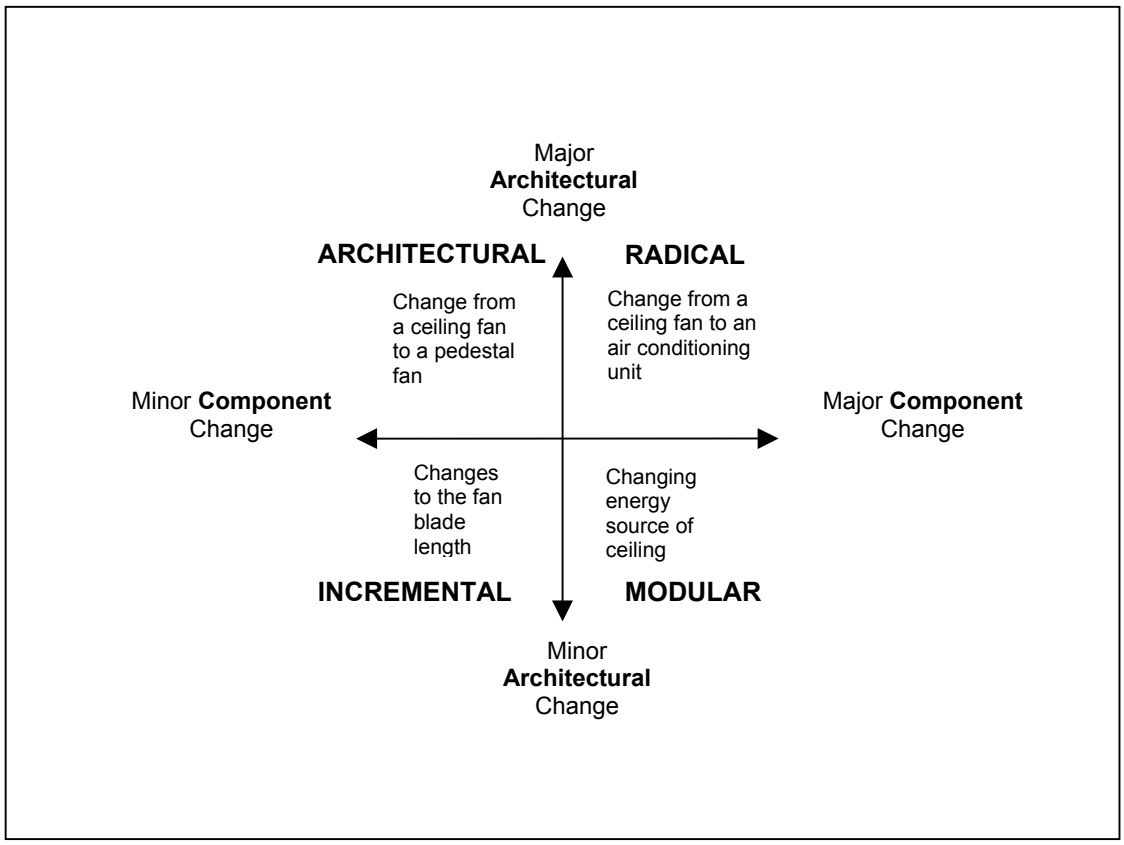

Figure 2. Examples of the four types of innovation

2.3 Organisational implications of innovations

The four types of innovation described in Henderson and Clark (1990) represent a continuum of change for organisations. Each type impacts on organisations differently as they provoke differing degrees of change for organisational competencies, values, roles, responsibilities and structure (Abernathy et al 1985). The building of competencies may require varied actions such as the development of new skills, organisational learning, establishing new interactions across functional boundaries, and altering organisation structure (Henderson et al 1990; Tushman et al 1986). Hence, being able to classify innovations into different types enables the organisation to better anticipate the organisational consequences of adopting the innovation.

Competencies are the skills, abilities and knowledge of the organisation (Gatignon et al 2002, Smith 2000; Tushman et al 1986). They are rooted in an organisation's experiences and are unique to it (Gatignon et al 2002). This uniqueness in organisational competencies means that one particular innovation may represent different degrees of change for different organisations. Hence, an innovation may be classified as incremental for one organisation but architectural or radical for

another (Afuah et al 1995). This means an innovation that reinforces or enhances competencies in one organisation may render the organisational competencies in another irrelevant.

New competencies may be acquired from an internal or external source. Gatignon et al (2002) argue that, depending on the type of innovation, the acquisition of new competencies from an external source may be less organisationally disruptive or challenging than adapting the existing competencies of the organisation. This is most likely to be the case with the adoption of architectural innovations. As mentioned above, knowledge associated with the architecture of a product tends to become embedded in the structure and processes of an organisation. This may make it difficult for those within the organisation who are accustomed to the existing processes, routines and structures to appreciate that change is necessary and should be supported (Henderson et al 1990).

Hence, given that changes to architectural knowledge can be organisationally disruptive, external support may be necessary to implement change.

In this section we have used Henderson and Clark's (1990) theoretical framework to classify innovations into four types. We have described the implications that each type has for organisational change. In the next section we adapt this framework to characterise different types of change in natural resource policy instruments.

3. Innovation in policy instruments

We believe that policy instruments can be viewed as different types of products that are adopted by organisations such as government departments and agencies. By applying Henderson and Clark's (1990) framework for classifying innovations into different types to the natural resource policy context we hope to develop guidelines for classifying policy instruments according to the type of innovation they represent. This may allow the organisational implications of adopting different types of innovations in policy instruments to be better anticipated.

To adapt Henderson and Clark's (1990) framework it is necessary to redefine some terms to make the framework more relevant to the concepts used in natural resource policy (see table one). In relation to product innovation, key terms included product concept, product component, product architecture and core design concepts for components and architecture.

The policy instrument equivalent to the notion of product concept is instrument concept. The instrument concept is a description of how the instrument achieves the policy objective. Different policy instruments achieve policy objectives in fundamentally different ways. For example, a cap and trade market is fundamentally different from an incentive program yet both may be used to achieve an environmental objective such as improved water quality. The purpose of both instruments (products) is the same but the way in which they achieve their purpose is fundamentally different. Consequently, their architecture and their components will be radically different.

Table 1: Definitions of terms in policy innovation framework

Product terminology	Policy equivalent	
Product Concept	Instrument Concept	A description of the way the policy instrument achieves its policy objective.
Product Component	Instrument Component	The documented rules, processes and procedures of a policy instrument that perform a certain function.
Core design concept – component	Component Principle	The fundamental ideas that guide the design of that component and how it achieves its function.
Product Architecture	Instrument Architecture	The way that the components of the policy instrument are arranged or integrated to form different types of policy instruments such as markets, regulations or incentives.
Core design concept – architecture	Architectural Principle	Fundamental ideas that guide how the policy instrument is designed to achieve the policy objective. These underpin the arrangement of components to form the policy instrument.

The components of a policy instrument are the documented rules, processes and procedures that are intended to perform a certain function. Their design is influenced by a set of component principles, which are equivalent to Henderson and Clark's (1990) core design concepts.

Component principles are fundamental ideas that guide the design of components and how they achieve their function. For example, an incentive program may have components such as a list of Best Management Practices for landholders, a pool of money to allocate to landholders to encourage adoption of the practices, and rules for allocating this money to landholders based on their adoption of the practices.

Each component performs a certain function. For example, the list of Best Management Practices describes behaviours that are believed to create environmental benefits. The money provides an incentive to adopt the behaviours. The allocation rules define how landholders will be rewarded for adopting the desired behaviours.

The architecture of a policy instrument is the way the components of the instrument are arranged. Different policy instruments have different architectures and are underpinned by different architectural principles. Architectural principles are the fundamental ideas that guide how the policy instrument is designed to achieve the policy objective. They guide the arrangement of components to form the policy instrument.

For example, the architecture of an incentive program differs from that of an auction or tender program. The components of both programs are broadly similar – a set of best practices or indices of environmental benefit, a pool of money, and rules and procedures for allocating the money. The incentive program involves linking rules for allocating money to implementation of best practices on the assumption that these practices will generate environmental benefits. The tender program involves linking rules for allocating money to indices of environmental benefit and allows management practices to be tailored to circumstances.

The incentive program is guided by architectural principles such as voluntary participation and influencing landholder activities through prescriptions of best practice, and ignores spatial variation in the environmental benefits of practices. The design of a tender program is also guided by the architectural principle of voluntary participation of landholders. However, landholder activities are not restricted to best practice in a tender program. Instead, using the principles of reward for achieving the measurable changes in the environment, and achieving change at least cost, landholders activities are influenced by rewarding landholders on the basis of measurable change in the environment (see table two).

Given definitions of the components and architecture of policy instruments, we have a basis for classifying changes in policy instruments into different types.

Table 2: Example of policy instrument components, architectures and principles

Policy Instrument	Instrument Components	Component Principles	Architectural Principles
Regulated practices	- minimum standards - rules and procedures prescribing allowed practices	- certainty of practices used - best practice applies uniformly	- compulsory participation - control over practices
Incentive Program	- funds to allocate - list of best practices - rules for allocation of funds	- reward adoption of practices - link between practice and environmental benefit	- pay for beneficial practices irrespective of environmental outcome - voluntary participation - control over practices
Tender or Auction Program	- funds to allocate - rules for awarding tenders - measurement of environmental benefit	- reward landholder activity based on environmental benefit - best practice depends on circumstance	- voluntary participation - pay for environmental benefit irrespective of how achieved - maximise return to expenditure
Cap & Trade Program	- property right definition - trading rules - rules for allocating property rights - environmental cap	- link between cap and environmental benefit - equity around allocation method - trading will bring the most efficient way of achieving the environmental benefit	- compulsory participation - environmental outcome first priority - flexibility for landholder to achieve environmental target - maximise efficiency of resource use

Henderson and Clark (1990) distinguished different types of innovation by the magnitude of change in the dominant design of a product's components or architecture. Following them, we distinguish between different types of policy innovations by the magnitude of change in the principles underpinning a policy instruments components or architecture (see figure three).

A change in a policy instrument that does not change any of the fundamental principles underpinning the components or architecture of the instrument is an incremental innovation. For

example, changes to the list of best management practices of an incentive program would be an incremental innovation. Such innovations entail minor changes to the existing instrument because they are consistent with the existing principles underpinning the policy instrument. They reinforce the dominant design concepts governing the components and architecture of the instrument. Consequently, this type of change is unlikely to be organisationally disruptive. Any changes in organisational capabilities are likely to be managed from within the organisation.

An innovation For example, changing an incentive program by allocating payments to landholders using a matrix system would be a major change to the dominant design of the payment component - hence a modular change. Linking payments to a matrix introduces a new reward principle. Landholders are now rewarded on the basis of the mix of practices they have adopted rather than for each practice in isolation. The matrix system provides greater rewards to landholders with a history of implementing best management practices.

The introduction of the matrix system creates a need for the organisation to develop new knowledge and expertise such as new documentation and monitoring procedures. The innovation may also require a change in the role or responsibility of groups within the organisation who are involved with the organisation and allocation of payments as well as the policing and verification of claims. Hence, a modular policy innovation is likely to generate changes for the organisation along functional, component-related lines.

An architectural innovation is change to the architecture of a policy instrument that leaves the components of the policy instrument largely unchanged. That is, an architectural innovation involves a change in the principles underpinning the architecture of the instrument while leaving the principles underpinning the components of the instrument unchanged. The change from an incentive program to encourage adoption of best management practices for conservation of biodiversity to a tender program such as Bush Tender would be an architectural change.

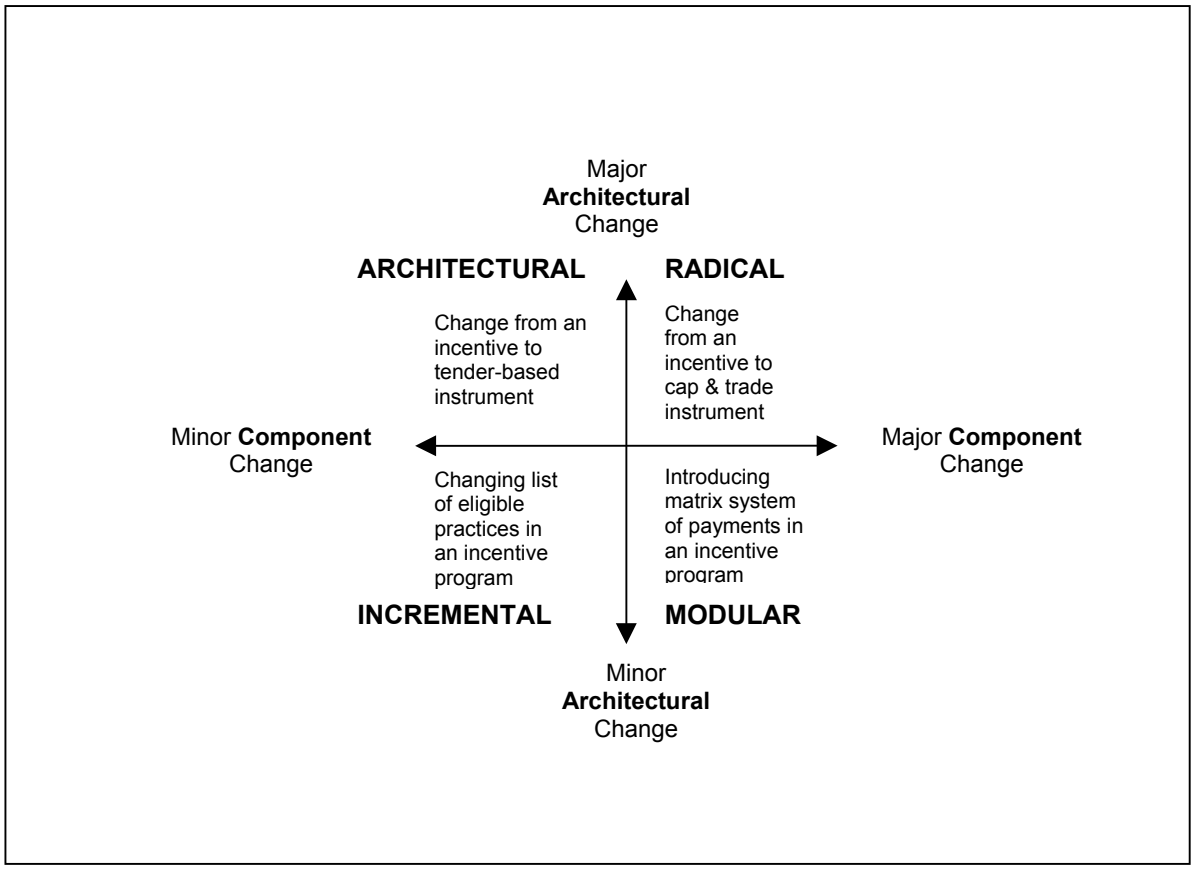

Figure 3: Examples of policy instruments as types of innovations

The components of the two instruments are similar but they are linked differently to form different policy instruments governed by different architectural principles. In terms of components, both instruments have a pool of money to be allocated to landholders and rules describing the basis for distributing money to landholders. However, the two instruments are underpinned by different architectural principles. The architectural principles of an incentive program include a principle of reward for adoption of practices rather than measured environmental improvement. Hence, eligible landholders receive similar rewards for adopting a practice, irrespective of the impact of the practice on the environment. In contrast, a tender program is guided by the principle of reward based on measurable evidence of environmental improvement. Another guiding principle of many tender programs is maximising environmental benefit for a given expenditure.

Architectural innovation can be both competence enhancing and destroying. To successfully implement the innovation the organisation in the example above may need to develop new competencies such as measurement techniques and procedures for negotiating contracts. In addition, successful implementation may also require establishing new relationships and communication channels between functional groups within the organisation. Much of the

knowledge, processes and structures developed around the incentive program may be redundant with the introduction of a tender program. In this sense the architectural innovation would be competence destroying from an organisational perspective.

Note that an architectural innovation may be triggered by changes to a component of an instrument. That is, an innovation that may appear to relate to one functional area of an organisation may trigger changes in other parts of the organisation, leading to a cascade of effects across the organisation (Henderson et al 1990).

Finally, a change in the principles underpinning both the components and architecture of a policy instrument constitutes a radical innovation. This type of change creates a completely different policy instrument that fundamentally departs from the dominant design of the current policy instrument. Naturally, the implementation of a radical policy innovation has considerable ramifications across the organisation. It requires the development of new competencies and potential changes in the roles and responsibilities of many functional groups within the organisation while rendering many existing competencies redundant. New competencies may need to be sourced externally to bridge gaps in competencies and to facilitate change. Hence a radically innovative policy instrument is likely to be organisationally disruptive and may take considerable time to successfully implement.

An example of a radical innovation would be the shift from an incentive program to a cap and trade market. The design and principles of the components as well as the architecture of the two instruments are quite different. The cap and trade instrument introduces new components such as environmental limits, definition of property rights, allocation mechanisms and trading rules. These components are underpinned by principles that are not relevant to an incentive program such as principles relating to the initial allocation of property rights.

Furthermore, the architectural principles underpinning the two instruments are distinctly different. In contrast to an incentive program, mandatory participation by landholders is a fundamental principle of a cap and trade market. Another important difference in architectural principles is that landholders have complete discretion over the way they exercise their property right in a cap and trade market including selling their right to another landholder. This contrasts dramatically with the architectural principle of restricting rewards to landholders on the basis of a prescribed set of best management practices that characterises an incentive program.

In this section we have adapted Henderson and Clark's (1990) framework for classifying product innovations to create a framework for classifying innovations in policy instruments. The framework provides a means to classify changes in policy instruments as one of four types of innovation based on the magnitude of change that the innovation introduces into the components and architecture of the existing instrument. This has allowed us to begin to consider systematic differences in the organisational consequences associated with implementing each type of policy innovation.

4. Conclusion

There has been increasing interest from various Government agencies in Victoria and New Zealand in the development of innovative policy instruments, such as market based instruments, to manage natural resources. The novelty of these instruments and the complex institutional environment within which they are adopted means choosing and implementing the right mix of instruments are challenging tasks. In this paper we have used innovation theory to classify innovations in policy instruments into four qualitatively different types.

Following Henderson and Clark (1990) we have developed a framework for classifying changes in policy instruments as incremental, modular, architectural or radical innovations. Each innovation has different implications for the adopting organisation in terms of the skills, knowledge and structures required for the successful adoption of the innovation. Understanding these implications can help to explain why some policy changes seem relatively inconsequential from an organisational point of view, while others can be very disruptive and problematic.

The management literature on innovation theory highlights the way in which organisational develop a unique set of competencies around product innovations, reflecting their particular idiosyncratic history. As a consequence, a particular innovation will appear qualitatively different to different organisations. This means that a particular policy instrument may appear to be a modular innovation to one organisation but architectural or even radical to another. Hence, the implementation of the innovation may have dramatically different impacts on the competencies of different organisations.

The successful implementation of some policy innovations in natural resource management depends on coordinated planning and cooperation across a number of organisations. To the degree

that the competencies of these organisations differ, the policy innovation will appear to be of a different type to each organisation, with consequent differences in the nature and extent of organisational change they each face. These differences severely test relationships between organisations and may place serious difficulties in the path of implementation.

We plan to apply the policy innovation framework we have developed here to case studies in natural resource policy in Victoria and New Zealand and to further explore implications that this framework has for the implementation of natural resource policy.

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