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**Minister of Research, Science and Technology**

## **Notice to the Foundation for Research, Science and Technology**

**Pursuant to Section 7 (1) of the Foundation for Research,  
Science and Technology Act 1990**

## **Government's Policies and Procedures for its Research, Science and Technology Investments**

## Blueprint for Change

### Government's policies and procedures for its research, science and technology investments

Issued on 11 May 1999 by the Hon. Maurice Williamson, Minister of Research, Science and Technology,

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This document, especially Section 3 (C), serves as written notice of the Government's priorities for the purchase of public good science and technology (PGST) outputs under section 7 (1) of the Foundation for Research, Science and Technology Act 1990. In addition to this Statement of Priorities, the annual appropriations process will specify allocations to specific PGST outputs. This specification will detail spending for the appropriation year plus two out-years.

#### Foreword

We are on the brink of a period of profound change in our society. All that we do, all that we make, and all that we earn will be altered by new knowledge and technological change. Knowledge differs from other resources—each new discovery provides a platform for further discoveries.

The Foresight Project, run by the Ministry of Research, Science and Technology in 1998/99, focused on exploiting knowledge for our future prosperity and well-being, and our development as a knowledge society. Foresight is simply a way of thinking about the future. Rather than projecting into the future with assumptions about how today works, foresight involves constructing a vision of a desirable future, and then identifying strategies to take you there. Through the Foresight Project, major innovation challenges for New Zealand were identified.

The Foresight Project provided a framework for thinking about the sort of future New Zealand wants, and defined the context for the Government's research, science and technology investments. The Government invests in research, science and technology to generate new innovative, economic, environmental and social capacity. In this way, the Government underpins innovation throughout all sectors of New Zealand. It cannot work in isolation, however. Innovation must be focused on the needs of end-users—whose lives, environments and enterprises will be affected by new knowledge and technological change.

The Government needs confidence that its research, science and technology investments will be rapidly and effectively exploited to achieve stated innovation goals. This is more likely where sectors demonstrate their strategic thinking about the future, through bold and dynamic innovation strategies.

This document provides a blueprint for change. It builds on the Foresight Project and sets a new framework for Government's investment in research, science and technology. The new framework has been designed to ensure that Government's investment will be managed in a more enabling and less prescriptive way. The policies and procedures outlined in the following pages relate specifically to management of Government's science envelope investment.

This statement of policies and procedures should take effect immediately. The rate of change for research, science and technology activities, however, depends on a range of factors, including the capacity to reorient researchers, develop new skills and methodologies, and build new collaborations. I therefore expect implementation of these changes to be phased in steadily.

MAURICE WILLIAMSON, Minister of Research, Science and Technology.

May 1999

#### 1. Introduction

In contrast to past Government statements concerning research, science and technology (RS&T) policy, this blueprint identifies what Government seeks to achieve through its investment, rather than how much it proposes to spend.

The overall goal of the investment is to develop a knowledge society, characterised by knowledge-led innovation.

The Ministry of Research, Science and Technology (MoRST) introduced the Foresight Project in 1997 to identify the major challenges New Zealand faces in achieving this goal. The two broad goals of the Project were to:

- encourage an ongoing process of strategic thinking across diverse communities, as a basis for developing a coherent and forward-looking view of needs and opportunities for new knowledge and technological change; and
- using the insights gained, develop a new set of priorities for contracts within Government's investment in research, science and technology, to take effect in July 2000, in order to complement the diverse strategic intents of other investors.

This blueprint represents one outcome of the Foresight process. It provides the blueprint for a framework designed to ensure that Government's investment in RS&T is directed towards stimulating the development of a knowledge society in New Zealand.

This framework will form the basis of output-contracts with the major purchase agents within the RS&T system. Currently these agents are: the Foundation for Research, Science and Technology (FRST), the Health Research Council (HRC) and the Royal Society of New Zealand (RSNZ).

The new framework consists of:

#### 1. A set of goals to set the key directions for investment decisions across the science envelope:

These goals apply to the whole science envelope, which comprises all of Vote RS&T, the research component of funding for tertiary institutes in Vote Education, and

government departments' investments in operational research.

These science envelope goals set out expectations that publicly funded RS&T will contribute to the development of New Zealand's innovative capacity and to economic, environmental and social capacities.

The Foresight Project has created a strong focus on innovation needs and is building new relationships and networks across many sectors. The science envelope goals encompass these key directions. They will help to ensure that Government's investment in RS&T is focused in areas that sectors have identified as critical to their futures.

*2. A set of target outcomes, based on sector-identified innovation needs:*

A set of 14 target outcomes has been developed. They describe desired future states for New Zealand. The sector aspirations expressed in Foresight strategies and submissions had a major contribution to the development of these outcomes.

The target outcomes will be the basis for research portfolios of contracted outputs that contribute to progress towards the science envelope goals. They act as a mechanism to actively ensure that research activities are not conducted in isolation.

*3. A performance measurement system, linking RS&T investments to the science envelope goals:*

The performance measurement system will increase the information available to Government to guide decisions on investment in RS&T. For each science envelope goal, several performance expectations have been identified. Together these form a set of 14 expectations linking RS&T investment to the four science envelope goals.

**2. How public investment in research, science and technology can contribute to the development of a knowledge society**

**A. Becoming a Knowledge Society**

The world economy is undergoing significant change, with an increasing emphasis on the ability to create, store, distribute and apply knowledge.

For New Zealand, the successful development of a knowledge society will involve moving to systems, services and products with higher levels of value added by knowledge.

Government aspirations for New Zealand focus on building an enterprise economy, creating a culture of innovation, enhancing the roles of individuals, families, communities and the private sector, maintaining and enhancing environmental quality and building national identity and cohesion. Collectively, they create a vision for New Zealand's future as a knowledge society.

Context for public investment in RS&T is also provided by RS&T:2010 The Government's Strategy for Research, Science and Technology to the Year 2010. This sets out the Government's broad vision for RS&T in New Zealand and covers the public and private sectors. The vision is built around three goals:

- fostering societal values and attitudes that recognise science and technology as critical to future prosperity;
- ensuring an adequate level of investment in science as a component in national life which has cultural value in its own right; and
- maximising the direct contribution of science and technology to diverse social, economic and environmental goals.

**B. The Foresight Project**

The Foresight Project was designed to establish a shared sense of the knowledge, skills, technologies and competencies New Zealand will need, through:

- analysing the RS&T required to underpin and realise the strategic outcomes and competencies identified by various sectors;
- identifying a set of nationally relevant target outcomes and competencies to which public investment in RS&T will contribute; and
- developing a high-level statement that sets out how Government will allocate its RS&T investments to achieve the target outcomes and build competencies, and developing strategies and guidelines for particular investments and agencies involved in managing them.

This blueprint is one of the results of the Foresight Project. The framework for Government's RS&T investment it outlines has been developed to ensure that New Zealand is able to play an effective part in the global knowledge economy.

This blueprint has been prepared by encouraging a wide range of groups across New Zealand to:

- think strategically about future directions for their sectors;
- identify their innovation needs and the contributions that RS&T can make to them; and
- make commitments to developing their own competencies and research capabilities.

These groups contributed to the development of the target outcomes through a consultation process that involved:

- public conferences in July and November 1998;
- analysis of the sector foresight strategies received in October and November 1998;
- publication of draft target outcomes in December 1998; and
- analysis of submissions on the draft target outcomes received in February 1999.

Approximately 140 sectors submitted strategies to MoRST in 1998. The target outcomes reflect the key aspirations which emerged across this set of submissions.

A draft set of target outcomes published in December 1998 drew approximately 130 responses from individuals and groups. These submissions enabled MoRST to reduce the number of target outcomes and to sharpen their focus and clarity.

**C. The Innovation System**

Traditionally, Government has seen its role in the science system as linear: to fund underpinning research and generate basic knowledge, which is then passed on for others to exploit. The increasing importance of knowledge in the economy and society, however, is creating pressure on Government to alter its role, in recognition of:

- the networked nature of innovation; and
- the critical role of RS&T within the innovation system.

The innovation system is characterised by flows, interactions, networks and people, rather than static structures. To reflect this, Government's investment policy needs to move away from predetermined funding targets for the RS&T investment, in favour of a more flexible and adaptive approach.

Key elements of this approach are:

- a focus on Government's role in promoting the integrity and capacity of the innovation system and delivering widespread net benefits over time. This

should take place without displacing or otherwise creating disincentives for investment by others.

- evolutionary rather than radical shifts in investment, focused on the science envelope goals, target outcomes and a performance measurement system. The aim is to move towards a system that supports knowledge-led innovation, as identified by the Foresight Project.
- decision-making at the level which has the best information on expected benefits. Purchase agents managing Government's RS&T investments will be accountable for outputs purchased and the stewardship expectations placed upon them.

#### D. Outline of Statement

This blueprint:

- outlines the investment framework agreed to for public investment in RS&T;
- sets out the roles and responsibilities for Vote RS&T stakeholders;
- lists the stewardship expectations required of those organisations that purchase research within Vote RS&T; and
- provides an indicative implementation timeline.

### 3. The investment framework

#### A. Science Envelope Goals

##### *Direction setting*

Four science envelope goals for Government's RS&T investment sit beneath the Government's strategic priorities and the RS&T:2010 strategy. They signal long-term directions. This is necessary because of the long-term nature of many RS&T activities. The goals:

- act as a mechanism for communicating Governments aspirations to purchasers, providers and users of publicly funded RS&T;
- provide a uniform set of directions across the science envelope, enabling elements of work carried out under different sources funding to be combined in coherent research portfolios; and
- act as an anchor point for the performance expectations designed to assess the efficacy of investments in RS&T.

##### *The goal statements*

There are four science envelope goals. All the goal statements have a similar structure. They identify the role to be played by RS&T in moving towards a national desired state. The innovation goal refers to the importance of innovation per se, but also underpins the social, environmental and economic goals.

1. Innovation goal: Accelerate knowledge creation and the development of human capital, social capital, learning systems and networks in order to enhance New Zealand's capacity to innovate.

The first goal recognises the importance of building a culture of innovation in New Zealand to underpin all other economic, environmental and social outcomes. RS&T should generate new knowledge, help develop human and network capacities, and stimulate an entrepreneurial culture so that New Zealand can be a full participant in the global knowledge age.

This goal links directly to the Government's aspirations to create an enterprise economy and to value innovation. It reinforces the Government's strategic priority on expanding the country's knowledge base and technological capabilities.

2. Economic goal: Increase the contribution knowledge

makes to the creation and value of new and improved products, processes, systems and services in order to enhance the competitiveness of New Zealand enterprises.

The second goal stresses the importance of new knowledge and technological change as a driver for value-creation, innovation, and productivity gains across the economy.

This goal identifies the contribution that knowledge makes to economic competitiveness. It provides a context for Government investment in RS&T consistent with the policy that investment should generate widespread net benefits over time, without displacing or otherwise creating disincentives for investment by others.

A focus on the knowledge base behind new and improved products, processes, systems and services will ensure that Government investment in RS&T complements the role of private sector investment in generating wealth for New Zealand. This goal links to the Government's aspiration to develop an enterprise economy.

3. Environmental goal: Increase knowledge of the environment and of the biological, physical, social, economic and cultural factors that affect it in order to establish and maintain a healthy environment that sustains nature and people.

The third goal emphasises how knowledge of environmental states and processes underpins our ability to improve environmental quality and integrity. It picks up ideas related to New Zealand's environmental heritage expressed in Government's aspirations and Government's strategic priority on biodiversity.

This goal focuses on improving understanding of the web of interconnected factors that determine the state of the environment. The knowledge gained will underpin sustainable management of all New Zealand's environments (terrestrial, marine and atmospheric), and will contribute to minimising hazards and risks associated with our unique environments. This will in turn contribute to better economic and social outcomes.

4. Social goal: Increase knowledge of the social, biological, environmental, cultural, economic and physical determinants of well-being in order to build a society in which all New Zealanders enjoy health and independence and have a sense of belonging, identity and partnership.

The fourth goal addresses the social outcomes that can be achieved through RS&T investments. It identifies a key role for RS&T in increasing knowledge about the wide range of factors that underpin social and individual development.

It also reflects the increasing international recognition that innovation is intimately linked to the social conditions in which it is produced. Thus, increasing knowledge of the determinants of well-being provides a platform for developing New Zealand's innovative capacity, and opens avenues for improving well-being in its own right. This goal links to the Government's strategic priority on extending economic and social participation.

##### *Applying the goals*

The science envelope goals provide overall direction for public investment in RS&T. They are designed to encourage stakeholders and purchase agents to seek more effective delivery of outcomes.

The goals will strongly influence investment decisions for Vote RS&T. They also provide a context for departmental research, including long-term, cross-portfolio, and applied social science research. They will not prescribe the content of this work, however.

For example, future discussions within Vote RS&T on research under the environmental goal should be influenced by departmental plans for research in these areas. This goal

should, in turn, influence the content of departmental research, so that there is alignment of Government's overall investment.

### B. Target Outcomes

The target outcomes enrich the interpretation of the four science envelope goals. Each target outcome gives part of a vision of what New Zealand's future as a knowledge society could be like.

Sector aspirations, expressed in Foresight strategies and submissions, contributed to the 14 target outcomes listed opposite. These outcomes:

- describe desired future states for New Zealand;
- provide a strategic context for development of RS&T portfolios and contracts within Vote RS&T—these are expected to contribute to the achievement of target outcomes without displacing or otherwise creating disincentives for investment by others; and
- provide cohesion for the public investment in RS&T.

The target outcomes are designed to challenge limited views of the roles of RS&T in society. They are deliberately cross-sectoral, so that users and providers of RS&T will rise above their specific interests and recognise shared national needs.

Examples of some of the contributions RS&T will be expected to make towards individual target outcomes are included with the full outcome statements in Appendix One. These examples are drawn from the key competencies requiring RS&T support that sectors included in the foresight strategies they developed as part of the Foresight Project. They illustrate the point that a wide range of RS&T activities will be expected within the portfolios purchase agents construct under each target outcome.

Together these examples provide some idea of the role of RS&T in achieving target outcomes.

Wealth from new knowledge-based enterprises  
 Innovative manufacturing and service enterprises  
 Sustainable use of natural resources  
 Wealth-creating food and fibre industries  
 Future-focused global intelligence  
 Infrastructure for a knowledge society  
 People with knowledge, skills and ideas  
 Strong families and communities  
 Maori development  
 Vibrant culture and identity  
 Health for all  
 People living in safe and healthy environments  
 Healthy, diverse and resilient ecosystems  
 New Zealand in the global biospherical environment

### C. Performance Measurement System

The performance measurement system increases the information to guide public investment in RS&T by providing a framework to report achievements. It will require that RS&T achievements are reported back to Government, and that continuous improvements to investment decision-making and system performance occur.

#### *Performance expectations*

RS&T performance expectations contained within the four science envelope goal statements relate to building New Zealand's innovative, economic, environmental and social capacity (Table 1).

These performance expectations have been expanded into a set of 14 impact expectations which form the basis

of the performance measures linking the science envelope goals to the target outcomes, as shown in Table 1. These impact expectations characterise the overall direction for the Government's RS&T investments, and the overall impact of these investments on New Zealand's innovative, economic, environmental and social capacity.

*Table 1: Performance expectations beneath the science envelope goal statements*

#### *Goal Statements*

Accelerate knowledge creation and the development of human capital, social capital, learning systems and networks in order to enhance New Zealand's capacity to innovate.

Increase the contribution knowledge makes to the creation and value of new and improved products, processes, systems and services in order to enhance the competitiveness of New Zealand enterprises.

Increase knowledge of the environment and of the biological, physical, social, economic and cultural factors that affect it in order to establish and maintain a healthy environment that sustains nature and people.

Increase knowledge of the social, biological, environmental, cultural, economic and physical determinants of well-being in order to build a society in which all New Zealanders enjoy health and independence and have a sense of belonging, identity and partnership.

#### *Impact Expectations*

- Expanding the knowledge base\*
- Building human and social capital\*
- Enhancing learning systems and networks\*
- Stimulating an entrepreneurial culture\*
- Improving the competitive positioning of NZ enterprises in the global knowledge economy
- Increasing technological intensity in NZ enterprises
- Developing and applying new, knowledge-based processes and technologies
- Developing and exploiting new, knowledge-based products and services
- Building knowledge and understanding of the integrity and quality of environmental systems, including hazards and risks
- Building knowledge and understanding of environmental processes and dynamics
- Improving the integrity and quality of environmental systems
- Building knowledge and understanding of determinants of social well-being
- Building knowledge and understanding of social processes and dynamics
- Improving social well-being

\* Impact expectations associated with the innovation goal also apply to the economic, social and environmental goals.

#### *Impact expectations in the investment framework*

The set of 14 impact expectations in Table 1 set the context for MoRST, on behalf of the Minister, to negotiate a set of expectations and indicators with purchase agents, and in turn for these organisations to do the same with science providers.

The proposed performance measurement system will improve the strategic focus of Government's RS&T investment by improving alignments of accountabilities from the Government's goals and priorities down to RS&T activities within contracts. The performance measurement system will also provide an integrated, upwards stream of

information on RS&T achievements. This will enable better decision-making about future RS&T investments at all levels.

Performance measurement modules reflect the achievement of expectations at different levels of the investment framework. These measures will include qualitative and quantitative performance indicators. They will be developed as existing work is realigned under the new target outcome framework.

The 14 impact expectations kick-start the top performance measurement module. Government has chosen to place additional emphasis on seven of the 14 impact expectations which are linked to three of its strategic priorities. These seven impact expectations are:

*Expand our knowledge base and technological capability*

- Expanding the knowledge base
- Building human and social capital
- Stimulating an entrepreneurial culture
- Improving the competitive positioning of NZ enterprises in the global knowledge economy
- Developing and applying new knowledge-based processes and technologies

*Extend economic and social opportunity*

- Improving social well-being

*Safeguard indigenous biodiversity*

- Improving the integrity and quality of environmental systems

These seven impact expectations are to be given additional emphasis when purchase agents make investment decisions within Vote RS&T.

#### 4. Roles and responsibilities

##### A. Ministry of Research, Science and Technology

MoRST will be responsible for:

- assessing the analyses from purchase agents across the target outcome set and providing advice to Government on funding levels of Output Classes and Outputs of Vote RS&T as part of the annual budget appropriations process;
- representing the value of Government's investment in RS&T in the context of its contribution to national innovation capacity, and to economic, environmental and social capacities;
- acting as the Minister's agent, providing advice on the nature and size of Output Classes and Outputs that Government purchases;
- negotiating purchase agreements and appropriate performance expectations with purchase agents;
- monitoring the performance of purchase agents and addressing any indicator-driven distortions that may develop over time; and
- monitoring purchase agents on the delivery of Outputs that have been contracted.

##### B. Purchase Agents

The investment framework outlined above will require significant changes in the nature and scope of the activities of purchase agents managing Vote RS&T investments. Purchase agents will implement the new investment framework by:

- managing and focusing their investment in ways that contribute to target outcomes;
- negotiating portfolios of RS&T programmes to contribute to each outcome; and

- providing an annual 'strategic analysis' to the Minister of Research, Science and Technology.

*Managing their investment in ways that contribute to target outcomes*

Purchase agents will continue to purchase outputs in the Output Classes and Outputs of Vote RS&T under the provisions of the Public Finance Act 1989. However, the target outcome structure will ensure that the outputs they purchase are structured and grouped so that they make coherent contributions to the science envelope goals.

Negotiation and relationship building are critical in a stable long-term purchasing environment, but contestability and fostering a diversity of ideas and approaches will remain important aspects of the purchasing strategy. It will also be crucial to foster interactive relationships between researchers, technologists, engineers and other professionals in the public and private sectors, that together underpin a vibrant and thriving knowledge-based society.

*Negotiating portfolios of research, science and technology programmes that contribute to each outcome*

The 14 target outcomes and, as appropriate, the sector strategies that support them, will be used as a starting point for developing research portfolios of contracted outputs within Vote RS&T. This approach will enable purchase agents to construct research portfolios in an innovative and flexible way.

Each portfolio will be designed to make an effective contribution towards the relevant target outcome. As a first step, purchase agents are to map their existing investments across to target outcomes.

Portfolio design is the responsibility of the purchase agents managing Vote RS&T investments—FRST, HRC and RSNZ.

FRST is unique in that it has responsibility for investments under several Output Classes (e.g., through Public Good Science and Technology, Technology New Zealand). It will be expected to organise contracts with providers under each of these Output Classes, to create portfolios of RS&T contracts that make contributions towards target outcomes.

Purchase agents responsible for Vote RS&T are to interact with government departments as they develop the research portfolios, and to ensure that Vote RS&T investments complement and support the RS&T activities in other Votes.

The Foresight Project has already led to a heightened level of contact and co-operation among Vote RS&T purchase agents. Purchase agreements are to specify the expectation that co-operation and negotiation among purchase agents will continue to be developed.

Purchase agreements with these agents will specify their responsibilities. The target outcome portfolios set up by purchase agents will be used as starting points for application of the performance measurement system.

The Marsden Fund Committee operated by the RSNZ will continue to fund the basic, untargeted research specified in its terms of reference. The Committee will be asked to provide strategic analyses of the opportunities and needs it sees for filling stock of knowledge and human-capacity gaps across target outcomes. These analyses will enhance the impact of its activities.

*Providing an annual analysis to the Minister of Research, Science and Technology*

*Initial analysis*

Purchase agents managing Vote RS&T investments will be required to provide an initial analysis of RS&T needs and opportunities for the target outcomes before significant changes from current investments are implemented. This

analysis should recognise the overall direction and strategic focus signalled by the Government, and characterise how investments should be reprioritised to address the target outcomes and goals.

To complement this initial analysis, purchase agents will also be asked to align current investments with the target outcomes. This will provide the starting point for reprioritising investments.

The analysis and investment plans for target outcomes will need to be agreed with the Minister of Research, Science and Technology before purchase agents implement new investments.

#### *Ongoing analysis*

As well as complying with financial management processes, purchase agents must provide information on the effectiveness of their investment decisions. Each October, purchase agents will provide a longer-term strategic analysis to the Minister of Research, Science and Technology which:

- reports on the nature and scale of their current and developing RS&T portfolios for each of their target outcomes;
- identifies possible changes to these portfolios over time, and the implications of such changes for the investments they manage; and
- advises how the funding emphasis across Output Classes and Outputs of Vote RS&T could change over time.

This analysis will be assessed by MoRST and fed into the annual budget process to ensure that any changes to appropriations are based on the best available information.

Over time this information will provide a strong basis from which to change the range and scope of Vote RS&T Output Classes to ensure that the science envelope goals are being achieved.

#### C. Providers

Providers of RS&T will need to recognise that:

- decisions on how much money is available for purchase agents to spend will be made through an informed annual budget process;
- they contribute to this budget process through the information they provide as part of the contracting process;
- the policies and procedures outlined in this blueprint will challenge them to think outside of particular sector groupings and to make wider connections in the work they do;
- any changes in purchasing will be evolutionary; and
- Government is placing a particular emphasis on expectations linked to the capacity to innovate.

#### D. Users

Many of the users of RS&T have contributed directly to the definition of the target outcomes through the sector strategies developed as part of the Foresight Project. These strategies have been compiled in the Innovation:Link 2010 database.

It is expected that sector groups will continue to use foresight methodology to focus on their future competencies and RS&T needs and to update or redevelop their strategies over time. These strategies will continue to be an important component in their interactions with purchase agents and providers.

The impetus for users to continue to engage in this process will come from the direct benefits they will receive from:

- thinking about their businesses differently; and

- positioning their own direct investment in RS&T.

Such benefits have already emerged from sectors grouping in new and unexpected ways and thinking jointly about their futures.

#### 5. Stewardship expectations

Government has ten explicit expectations regarding the mechanisms of allocation of resources to RS&T activities within the science envelope. Purchase agents will be held accountable for their stewardship of these mechanisms through the performance measures developed with them and reflected in their specific purchase agreements. Not all expectations are relevant to all purchase agents. Individual purchase agreements will indicate which expectations will require particular attention. These expectations will also impact on providers and users as they influence the way in which target outcome research portfolios are developed and allocation decisions are made.

##### 1. Focusing on outcomes

Government's goals are to be implemented by purchase agents focusing on outcomes. The 1997 statement of priorities for FRST clearly identified a need to move from:

'a strong focus on small scale purchasing of outputs, over relatively short time frames, and within a rather rigid framework of rules and procedures'

to

'a strategic far-sighted and proactive strategy for focusing on the achievement of outcomes'

These expectations matched directions to the HRC to identify more clearly how their funding decisions will contribute to outcomes. FRST and the HRC have each incorporated an outcome focus in many of their recent purchasing decisions. The implementation of the Foresight Project intensified this move, through involving a wide variety of providers and users in identifying the target outcomes which they believe to be important for the future of their sectors. The Marsden Committee operated through RSNZ will be asked to provide information on how their investments contribute to target outcomes, and analysis of the opportunities it sees for knowledge and human capacity gaps across the target outcomes.

##### 2. Supporting future-focused sectors

Rather than merely supporting existing sector interests, emphasis should be given to knowledge-led innovation. Building on progress made through the Foresight Project, purchase agents will encourage and facilitate ongoing development of innovation strategies, across diverse sector groups. This process involves ongoing updates of RS&T investment priorities and maximises the adoption of results.

##### 3. Purchasing balanced portfolios

The principle that public good RS&T should be based on balanced portfolios, developed through negotiation and relationship building, was established in the previous policy statement.

Portfolios should include a diversity of RS&T ideas and approaches, and include a mix of strategic underpinning science, applied research, user-linked information transfers and technological learning initiatives. They should deliver widespread net benefits over time, without displacing or otherwise creating disincentives for investment from others.

##### 4. Fostering collaboration and integration

Purchase agents will need to work collaboratively, to ensure coherence in areas of overlapping interest for the various investments within Vote RS&T. Overlaps in the funding system are preferred to gaps, so that innovation-related activities falling into borderline areas are not disadvantaged.

#### 5. Smart purchasing, relationship contracting and contestability

Portfolios of research will be designed and contracted through a three-way negotiation between providers, users and purchase agents. Purchase agents will be required to facilitate these relationships. They will balance the benefits of allowing scientists and users to define the problems and devise the best approaches to solving them, with the need to ensure that the research investment is being directed towards achieving target outcomes.

All purchase agents must operate a transparent and contestable process for making investment decisions. Any individual, public or private enterprise or organisation can signal an interest in being part of the negotiation of a portfolio of research.

#### 6. Meeting standards of merit

All RS&T proposals must meet acceptable standards of merit. Selection among proposals of satisfactory merit is to be on the basis of potential contribution to the science envelope goals set out in this document, and in purchasing strategies developed by purchase agents.

In making assessments, purchase agents are to consider the entire portfolio of proposals for the relevant target outcome, and determine the mix which is, in their view, most likely to achieve that outcome by contributing to the science envelope goals and the strategic goals for that Output Class. Fostering the diversity of ideas and approaches within each portfolio is to be a strong principle in determining the distribution of funding.

#### 7. Paying the full costs

Government investments in RS&T are to be fully funded in such a way that the contribution to target outcomes is achieved as efficiently and effectively as possible. Contributing to target outcomes will involve integrating a wide range of activities collectively employing a wide range of assets. The development and maintenance of RS&T assets, including databases and collections, should be funded in full.

Full funding also means ensuring that the primary results of publicly funded RS&T are made available by providers to the public and stakeholder groups, through appropriate means, at the marginal costs of dissemination.

Any compliance costs passed on to providers as a result of purchase agents' obligation to provide information to MoRST, for example, for the purposes of evaluating the effectiveness of the investment, are to be treated as part of the full cost of programmes.

#### 8. Using strategic analysis as the basis for Government's investment in RS&T

In addition to complying with financial management processes, purchase agents are to provide information on the effectiveness of their investment decision, through an annual analysis to the Minister of Research, Science and Technology. This will be fed into the annual budget process to ensure that any changes to appropriations (the Output Classes or Outputs purchased) are based on the best available information. The Output Classes and Outputs purchased in Vote RS&T in 1998/99 appear in Appendix Two.

#### 9. Responsiveness to Maori

Purchase agents are expected to design research portfolios that are responsive to the needs and diversity of Maori. FRST has a legal obligation to consult with Maori in their policy development process. The HRC has addressed Maori health research issues through its statutory Maori health committee.

All the target outcome areas should contribute knowledge that will assist in the advancement of Maori. In designing

portfolios beneath each target outcome area, purchase agents need to consider research that addresses disparities between Maori and non-Maori in New Zealand, and recognises Maori knowledge requirements.

An outcome specifically related to Maori development has also been included in the target outcome set. In this target outcome a focus on Maori people is fundamental, in recognition of the Treaty partnership. Any research that contributes to this outcome will need to develop appropriate methods to assess Maori-specific methodologies and approaches to research.

#### 10. Optimising global connectedness

Public good RS&T should contribute to and draw from the global knowledge base. Portfolios should be managed to optimise interaction with the best international RS&T and to ensure information on emerging knowledge, technologies and market opportunities is widely available.

Government needs RS&T inputs to ensure its participation in multilateral and bilateral fora maximises benefit to the New Zealand economy and innovation system. This benefit should be managed through development of portfolios based on negotiation between the purchase agents and responsible government departments.

### 6. Timeline

#### IMPLEMENTATION TIMELINE

The approach to RS&T investment set out in this blueprint will require MoRST and purchase agents to develop new strategic competencies. It will also take time to realign existing work under the new target outcome framework and to develop new working relationships across the system. Changes will be implemented over the two-year period between May 1999 and the middle of 2001.

Key steps in this timeline will be:

- October 1999—purchase agents provide interim reports on alignment of RS&T contracts into portfolios and on opportunities and needs for future investment.
- During 2000—new processes for bidding and tendering put in place by purchase agents, where required.
- From July 2000—RS&T contracts are managed as portfolios aligned to target outcomes.
- July 2000—report to Cabinet on new Output Classes and funding levels for Vote RS&T.
- By July 2001—new Vote RS&T Output Classes in place. RS&T contracts arising from new bidding and tendering processes come into effect under these Output Classes.
- September 2002—report to Cabinet on effectiveness of new policies and procedures.
- By June 2004—existing 6-year PGSF contracts end, transition to new system completed.

#### APPENDIX ONE: Full Target Outcome Statements

##### TARGET OUTCOME STATEMENT

*Wealth from new knowledge-based enterprises.* New Zealanders recognise that ideas are the basis for new wealth-creating business. The entrepreneurial capacity to generate and exploit ideas is valued and highly developed.

*Examples of the contributions RS&T could make towards this target outcome:\**

- Expanding the knowledge base and developing new enabling technologies in knowledge-based emerging areas of the global economy such as biotechnology, nanotechnology, advanced materials, and information and communication technologies.



- Fostering identification and exploitation of new business opportunities in emerging knowledge-based areas of the economy including market intelligence and knowledge management systems.
- Enhancing networks and information flows within emerging knowledge-based areas of the economy to build investment capabilities and accelerated commercialisation of new ideas and technologies.
- Building awareness and understanding in the wider community of the role of RS&T in emerging knowledge-based areas of the economy.
- Developing flexible, broad skilled, entrepreneurial and adaptive men and women who use innovation to commercialise new ideas and technologies.

\* The examples for all outcome statements are illustrative only and may or may not describe RS&T contributions that are ultimately contracted.

#### TARGET OUTCOME STATEMENT

*Innovative manufacturing and service enterprises.* New Zealand's manufacturing and service enterprises are globally-focused, adaptive, niche-orientated, entrepreneurial and highly networked. They generate wealth for New Zealand by developing and applying technologies and ideas.

*Examples of the contributions RS&T could make towards this target outcome:*

- Fostering identification and exploitation of business opportunities in the global knowledge economy through improved market intelligence and knowledge management systems.
- Enhancing flexible and adaptive production capacity in enterprises, to enable rapid response to consumer needs in global markets.
- Building networks and collaborations involving enterprises and RS&T providers to build technological capacity in enterprises and drive innovation.
- Enabling the development of new and improved systems and technologies to underpin sustainable exploitation of eco-tourism opportunities.

#### TARGET OUTCOME STATEMENT

*Sustainable use of natural resources.* New Zealand understands the valuable contributions natural resources make to wealth creation. Innovative and efficient methods are used to maximise the long-term value from these resources and sustain the ecosystems that support them.

*Examples of the contributions RS&T could make towards this target outcome:*

- Fostering identification and exploitation of business opportunities in the global knowledge economy, including market intelligence and knowledge management systems.
- Expanding the knowledge base of natural mineral, energy and marine resources and their commercial potential.
- Developing new and improved technological capabilities in extracting and processing mineral, energy and marine resources.
- Developing and applying technologies and processes for maximising value, minimising waste and rehabilitating damaged ecosystems to ensure durable use of mineral, energy and marine resources.
- Developing new knowledge and capabilities for the use of more eco-efficient technologies throughout production systems and as the basis for product innovation.

- Building the knowledge base of the linkages between the ability of New Zealand enterprises, to achieve and sustain a competitive, healthy and safe environment.

#### TARGET OUTCOME STATEMENT

*Wealth-creating food and fibre industries.* New Zealand recognises that wealth creation from food and fibre resources requires consumer-oriented, value-added products, processes and services. These wealth-creating activities are built on innovative, efficient and sustainable use and development of these resources.

*Examples of the contributions RS&T could make towards this target outcome:*

- Fostering identification and exploitation of business opportunities in the global knowledge economy.
- Expanding the knowledge base of food and fibre resources (animals, pastures, crops, fisheries and forests) and their commercial potential, and how to assure the sustainable use of these resources and supporting ecosystems.
- Developing new and improved products, processes and services for increasing the value of food and fibre industries.
- Global franchising and licensing of locally developed technologies and services in food and fibre industries.
- Developing analytical and measurement techniques and processes for ensuring product safety and integrity, and compliance with ethical, welfare and safety standards.

#### TARGET OUTCOME STATEMENT

*Future-focused global intelligence.* New Zealand exploits its ability to identify and apply emerging scientific, technological and market opportunities. This intelligence is used to generate new, high-value, globally-focused products, processes and services.

*Examples of the contributions RS&T could make towards this target outcome:*

- Expanding the knowledge base of global trends in consumer values, attitudes, behaviours and preferences.
- Increasing understanding of consumer attitudes to new technologies, products and services.
- Building networks and collaborations that enable increased access to the global knowledge base.
- Developing knowledge management systems that enable enterprises and RS&T providers to access global trends relating to new knowledge and technologies, and consumer attitudes and behaviours.

#### TARGET OUTCOME STATEMENT

*Infrastructure for a knowledge society.* New Zealand's infrastructural resources provide efficient, leading-edge support for a networked, knowledge-based society. Risks are understood and managed. Physical infrastructure and business and regulatory frameworks are harmonised to create capacity for progress.

*Examples of the contributions RS&T could make towards this target outcome:*

- Planning and integrating new and improved technologies for reliable and responsive provision of infrastructure services including information, communications, energy, water and waste.
- Ensuring high quality and commercially relevant standards and conformance systems.
- Increasing understanding and improving management of risks to infrastructure services.

- Developing ethical and effective regulatory, business and professional frameworks.

#### TARGET OUTCOME STATEMENT

*People with knowledge, skills and ideas.* New Zealanders embrace the knowledge age. They actively pursue knowledge and the development of ideas and skills required for New Zealand's success as a society and economy.

*Examples of the contributions RS&T could make towards this target outcome:*

- Fostering a national culture supportive of the positive role of RS&T in future prosperity and well-being.
- Expanding the knowledge base and human capital, to underpin future innovation across diverse areas of society.
- Developing links with the global knowledge base.
- Expanding networks and learning systems across the innovation system to stimulate creativity through cooperation and cross-discipline collaboration.
- Increasing technological literacy, skills and knowledge, to enhance men and women's participation in work and society.

#### TARGET OUTCOME STATEMENT

*Strong families and communities.* Strong families and communities are the basis for an economically successful and socially cohesive nation. Families and communities prosper within a culture of self-determination and social responsibility. There is active community participation. Local economies are dynamic.

*Examples of the contributions RS&T could make towards this target outcome:*

- Improving knowledge and understanding of factors that influence participation in economic and social activity and the incidence of negative social behaviours such as offending and suicide.
- Developing technologies, products, processes and services for encouraging self-determination and social responsibility.
- Fostering networks and collaborations that support learning and participation in social and economic activity, through families, communities and local and regional economies.

#### TARGET OUTCOME STATEMENT

*Maori development.* Maori achieve well-being, self-sufficiency, prosperity, equity, justice and political effectiveness.

*Examples of the contributions RS&T could make towards this target outcome:*

- Developing Maori intellectual capital and capacity through participation in the RS&T system.
- Enhancing the ability of Maori to develop and manage their resources by developing science and technology skills and networks to enable economic self-sufficiency.
- Developing an understanding and appreciation of Mātauranga Māori and Tikanga Māori.
- Building an infrastructure relevant to robust Maori development. For example, understanding governance structures.
- Understanding the social, cultural and economic determinants of well-being.

#### TARGET OUTCOME STATEMENT

*Vibrant culture and identity.* New Zealanders understand, value and proudly promote their distinctive cultural identities, heritages and achievements. This understanding

shapes knowledge and innovation and enhances opportunities for increasing prosperity and well-being. New Zealand's place in the Pacific and its unique Maori culture and identity are recognised and celebrated.

*Examples of the contributions RS&T could make towards this target outcome:*

- Improving knowledge and understanding of factors and influences that shape New Zealanders heritage and identity.
- Promoting awareness and understanding of cultural determinants of social and economic success in the areas of science, business, arts and sports.
- Fostering networks and collaborations to develop New Zealand's international reputation as a culturally diverse, inclusive society.
- Developing technologies, products, processes and services for creating and sustaining economic wealth from cultural resources, especially among Maori and Pacific people.

#### TARGET OUTCOME STATEMENT

*Health for all.* Individuals, families and communities throughout New Zealand enjoy high health status and independence. New Zealand's unique and innovative health delivery systems combine international best practice with local experience and knowledge of needs.

*Examples of the contributions RS&T could make towards this target outcome:*

- Expanding knowledge and understanding of factors influencing health status, including disparities, of New Zealanders.
- Developing technologies, products, processes and services for improving health status and reducing health disparities among New Zealanders.
- Fostering networks and collaborations for increasing global access to health care knowledge and technologies.
- Developing knowledge management systems for integrating health information and disseminating new health care technologies and services.

#### TARGET OUTCOME STATEMENT

*People living in safe and healthy environments.* New Zealand has healthy and safe urban and rural environments that sustain and enhance the well-being of people and communities. We enjoy our living space, manage our interactions with the environment and have secured high-quality, safe and healthy lifestyles.

*Examples of the contributions RS&T could make towards this target outcome:*

- Expanding the knowledge base of the state of New Zealand's living environments, including their economic, social and recreational value.
- Expanding the knowledge base of the effects of the state of the environment on the health and well-being of people and communities, and how to manage effects.
- Increasing understanding of factors influencing the health and safety of living environments.
- Developing effective and efficient management systems for minimising biological and physical hazards and risks and their negative impacts on human communities and life supporting systems.
- Developing effective and efficient management systems to enable sustainable use of urban and rural environments.

- Promoting a national culture where people value and maintain healthy environments.

#### TARGET OUTCOME STATEMENT

*Healthy, diverse and resilient ecosystems.* New Zealand has healthy, diverse and resilient ecosystems that sustain nature and people. We understand and value our ecosystems, are environmentally responsible and have assured the long-term quality and capacity of land, marine, freshwater and air resources.

*Examples of the contributions RS&T could make towards this target outcome:*

- Expanding the knowledge base of the state of New Zealand's diverse environments, including air, water and terrestrial systems, and natural resources of significance to hapu and iwi.
- Expanding the knowledge base of factors affecting ecosystem health, including urban development, contamination, and resource use.
- Expanding the knowledge base of the determinants of environmentally responsible behaviour.
- Developing effective and efficient environmental management systems for increasing biodiversity and repairing and rehabilitating damaged ecosystems.
- Developing technologies and services for efficient and sustainable use of environmental resources, including minimising waste and pollution, in order to optimise economic and environmental benefits.
- Promoting awareness and understanding of factors affecting environmental quality and risks to diverse and resilient ecosystems.

#### TARGET OUTCOME STATEMENT

*New Zealand in the global biophysical environment:* New Zealand exploits its ability to influence and contribute to international global environmental change programmes. Knowledge gained from these programmes is used to improve our understanding of the effects of global change processes on our ecosystems and the production systems dependent on them.

*Examples of the contributions RS&T could make towards this target outcome:*

- Increasing knowledge of global-scale crustal processes and dynamics.
- Increasing knowledge of oceanic and atmospheric processes and dynamics and their effects on New Zealand's ecosystems and production systems.

- Expanding the knowledge base of factors affecting global ecosystem health, including climate variability.

#### APPENDIX TWO: 1998/99 Output Classes and Outputs purchased in Vote RS&T

OUTPUT CLASS \$ (MILLION)	RESPONSIBLE AGENT(S)
<b>Research, Science &amp; Technology Outputs</b>	
Public Good Science and Technology	317.335
Foundation for Research, Science & Technology, Health Research Council	
Non-specific Output Funding	26.131
Foundation for Research, Science & Technology	
Marsden Fund	21.839
Royal Society of New Zealand	
Technology New Zealand	15.694
Foundation for Research, Science & Technology	
Human Resources Development	5.235
Foundation for Research, Science & Technology, Health Research Council	
Provision of National Measurement Standards	4.154
Industrial Research Limited	
Promotion of Science and Technology	3.511
Royal Society of New Zealand, Foundation for Research, Science & Technology, plus others	
International Science and Technology Linkages	1.038
Royal Society of New Zealand, Ministry of Research, Science & Technology	
Science and Technology Publications	0.467
Royal Society of New Zealand	
<b>System Overheads</b>	
Contract Management for Science	9.611
Foundation for Research, Science & Technology, Health Research Council, Royal Society of New Zealand	
Policy Advice for Research, Science	0.400
Foundation for Research, Science & Technology	
Science and Technology Policy Advice	5.324
Ministry of Research, Science & Technology	
Management of Contracts for Non-departmental Outputs	0.675
Ministry of Research, Science & Technology	

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