

the Royal Society of New Zealand Strategic Plan, 2006 – 2011

Approved by Council, 8 June 2006



1. EXECUTIVE SUMMARY

1.1 Science Excellence

The Royal Society of New Zealand stands for excellence in science. Excellence has great significance in both the practice of science and its application to our daily lives. The performance of the science system is measured by its contribution to our well-being, the health of the economy, social gain and by its contribution to the world's knowledge base. The Government recognises that science and technology are critical in charting New Zealand's future well-being. The Society's strategic plan is focused on excellence in the practice of science and improving the performance of the science system.

The Society will consult regularly with the Academy Council to ensure that it fully supports the Academy's role in defining and supporting excellence in science in New Zealand.

1.2 Leadership

Maintaining science excellence requires inspired leadership. The Society, through its Act, has a particular responsibility in representing science and scientists in New Zealand. Our leadership to provide action is critical for the success of this strategic plan. This includes strengthening our relationships with New Zealand science-based institutions and funding bodies. There are significant issues to address including future science directions, and ensuring that science capability, long-term career development, infrastructure and funding are not the limiting factors in achievement. We need to address and monitor the performance of the system and understand what a high performance system can deliver.

The Society must also collaborate effectively with all organisations that are involved in funding and sustaining the science system. The Society's resources include the skills and expertise of our constituency and members. We need to make more use of these as well as strengthen our relationships with New Zealand science-based institutions and funding bodies.

Our key actions in 2006/2007 will be the following:

1.2.1 Excellence and Leadership in Science

The Society will support the Academy Council to identify and acknowledge excellence and outstanding leadership in science in New Zealand, and promote the value of our national science activities to the community.

1.2.2 The National Science Panel (NSP)

The Society will complete the establishment of a National Science Panel (NSP). The NSP will work with the Society to identify barriers that limit the practice of science and work to remove them.

1.2.3 Building Long Term Scientific Capital

The NSP and the Society and Academy Councils will support the NSP to give priority to better use the expertise of our Fellows and members in identifying and addressing important science issues of the day and immediate future.

1.2.4 Science Funding Strategy

The Society will work closely with the NSP, with government agencies and business groups to evaluate the need to grow New Zealand's science funding. This will involve greater assessment of future priorities and better understanding of the value of research and education. As a benchmark, we need to lift New Zealand's R&D expenditure above the OECD average.

The Society will work with the Marsden Fund Council to grow the funding for this council and provide high quality support for its activities.

1.2.5 Energy

Energy security is vital to New Zealand's economic future. The Energy Panel which reports to Council, will produce a report mid-2006, and continue to work toward the establishment of a National Energy Strategy and the identification of the core research and development capability needed to implement this strategy.

1.2.6 Education Development Strategy

The Education Committee of the Society will, in 2006, define the niche in which the Society's educational activities will be focused. The Society will then actively move to coordinate and strengthen its educational activities around its two foci – young people and teachers.

1.2.7 Promotion of Science and Technology

Science-based solutions to major issues form part of a long-term process, usually exceeding the length of a political cycle. The Society will continue to promote the benefits of science and technology to the S&T community, to decision makers and to the wider public, using its staff resources, the abilities of the Companions and Fellows, branches, constituents, appropriate community members, the media and sponsors.

The Society will target the National Science Honours dinner for expansion to a television audience to recognise excellence and achievement in Science and Technology.

1.3 Financial Planning

The Society's five year financial plan includes a site development plan, aiming for net assets totalling \$15.5 million by the end of 2011, and annual revenues reaching \$8.3 million per annum through a blend of property revenues, corporate support and output agreements that deliver on our core activities. The Society will also begin to target bequests from our membership to develop a new long term revenue stream.

1.3.1 Growing our membership

Our Society's most valued assets are its constituent organisations and members, and their role in promoting science activities across New Zealand. We will work with our constituents to increase membership of the Society by 10% per year for the next five years.

We need to address support from the business community. We will explore a novel corporate membership programme with the aim of growing the funds needed to support the NSP, energy research capacity, and new education initiatives.

1.3.2 Site Development

The Society will develop the Wellington property into a campus that is seen as the National Centre for Science and Technology.

1.4 Review Strategy

The Society will review its committee structure and function and assess the contribution of its committees to the 2006-2011 Strategic Plan.

The Society will also review its current internal management structure and processes to ensure that it has the necessary skills and expertise to undertake the strategic, financial and programmes initiatives planned for the next five years.

2. THE ROYAL SOCIETY

2.1 Vision

The Royal Society serves New Zealand through our search for understanding.

We work to build a nation where scientists and technologists contribute their talents and skills to the welfare and prosperity of New Zealand and sustainability of our environment.

The Society was established in 1867 to be the body of excellence and enquiry into matters scientific. Today our activities are supported by over 1300 members, 363 Fellows, 21 Companions, 50 societies, 10 branches, 10 affiliates, and a staff of 36 FTE in Wellington, with an annual operating budget of \$5.4m. Some \$3m pa comes from the Ministry of Research, Science and Technology through an Output Agreement.

Our Act of 1997 mandates the Society to:

Contribute to New Zealand society:	Support New Zealand's S&T community:
1. Promote public awareness, knowledge, and understanding of S&T	4. Encourage, promote, and recognise excellence in S&T
2. Advance S&T education	5. Provide support and a conduit for the professional needs and development of scientists and technologists
3. Provide expert advice on important public issues to the government and the community	6. Establish and administer for all members a code of professional standards and ethics in S&T

2.2 The Practice of Science

The practice of science begins with educators, has its heart in nurturing creativity in our research-based institutions, seen by the community to be applied in business and demonstrating clear social gains and improvements to well-being. Our major science engines are our Universities and Crown Research Institutes (CRIs). The future health of these institutions is a matter of concern.

There may be excessive competition between Universities and CRIs for limited funding pools. Our younger scientists see this as a disincentive to collaboration and creativity. The science system can only benefit if measures are introduced to enhance collaboration and the well-being of their staff.

In today's economic climate, there is a need for better information on the performance of our science system. The Society has a unique role in being a forum where science needs can be strongly debated and better ways are found to assess performance.

2.3 Working with Stakeholders

The Society shares the view that all partners in New Zealand's knowledge society must work together. Our immediate stakeholders are those Branches and Societies which form the Constituent Organisations of the Royal Society. These organisations themselves sit in the wider science and technology community, and include those which create the concepts and undertake the research to end-users of research, those which represent science and/or scientists and play an administrative role in science organisation or funding, and those which formulate policy for the advancement of science and its contribution to New Zealand.

2.4 Leadership

To take a greater leadership role in our science system it is important that the Society works closely with the Ministry of Research, Science and Technology, the major funding source of science activities in New Zealand. Both the Society Council and the Academy Council have roles to play in supporting science funding and assessing future needs.

2.5 Code of Ethics

The Society has developed and published a Code of Professional Standards and Ethics. The code is binding on our members. We will develop a teaching resource to broaden scientists' awareness of the code.

3. SCIENCE PRIORITIES, 2006-2011

The Council has targeted the following priority areas where greater leadership can significantly improve the performance of our science system. These priority areas for 2006-2011 are the following:

- Providing expert advice into decision-making structures
- Science direction, funding and career structure
- Education
- Communication of science.

These priorities of the Society and the Academy Council will not detract from their ongoing work in promoting excellence and growing the Society's income. The Society will continue to assess its capabilities to fulfil its Act and to support the priorities established by Council.

3.1 Providing Expert Advice

We will continue to target the need for greater inclusion of scientists in decision-making processes. The Society will promote strong debate on science issues through the development of a National Science Panel and, with the Academy Council, through making better use of the expertise of our Fellows and members in addressing important science issues of the day and immediate future. The NSP will include scientists as well as leaders outside of science, and address strategic issues with the purpose of improving the performance of the New Zealand science system as well as giving expert advice on such issues to government and the public.

3.2 Science Direction, Funding and Career Structure

We believe that the performance of the science system will benefit from greater clarity around science direction, building new capability and infrastructure, and introducing new initiatives that are aimed at enhancing career prospects for young scientists.

A significant research funding issue lies in the low level of business investment in research. While the structure of the New Zealand economy presents problems for research uptake, many businesses do not place high value on R&D in their operations. We need to change this.

Scientists seek greater science productivity and job satisfaction. A major barrier to productivity is the excessive time put into grant applications to small funding pools where the competition ensures that the success rate is very low. This needs to be addressed.

3.3 Education

The Council of the Royal Society sees education as vital to a well-educated public that understands the science issues of the day, and to providing trained people who will become the next generation of scientists, technologists, and leaders, contributing to knowledge and well-being. Our current education programmes are perceived by some as being diffusely spread over a wide area, reflecting the breadth of the RSNZ mandated sphere of interest. In 2006, the Education Committee of the Society will lead an initiative to review our education programmes, their place within the NZ Curriculum Framework and post-compulsory education, and determine on the most appropriate niche for the Society to occupy in the education sector.

3.4 Communication of Science

We place great importance in the continual process of communicating science to the public. The Society will increase activities that communicate the value of science and illustrate how science and technology underpin the well-being of New Zealanders. We will review our communications strategy to ensure we are reaching as wide audience as possible across New Zealand and effectively delivering science information.

4. SCIENCE ACTIVITIES AND STRATEGIES

4.1 Providing Expert Advice

Last year the Society produced three major papers: S&T capabilities in NZ; large-scale equipment; and tax incentives for R&D, and responded to several policy requests from government. The following are the key activities for 2006-2011:

4.1.1 A National Science Strategy Panel

The Royal Society of New Zealand will establish an independent National Science Panel. This is a task that Council, through its elected members, needs to promote through enlisting the nation's foremost scientists, engineers, health professionals, educationalists and other experts to address organisational, scientific and technological aspects of society's most pressing problems. These include our national economic security, the security of our science organisations, and how we measure scientific output and value, and how science education might contribute to all of these.

4.1.2 Focus On Research Excellence (FoRE)

The Academy Council is undertaking a comprehensive study of the outcomes of investing in excellent basic research. The "FoRE" project will develop a number of case studies of outstanding "blue-skies" research. These projects, all from the last 10 years, will be analysed in depth and all benefit flows

analysed. The study will feed into the debate about how science is directed. Projects known to have already started to have a wide impact will be selected from several hundred “excellent research” projects that have been completed over the past decade. These selected projects will be analysed in depth and all benefit flows will be studied.

4.1.3 The Sustainable Energy Panel

The future of energy in New Zealand is a matter of widespread concern, with the potential to change our economic growth, social health and security. The Society has set up its Sustainable Energy Panel, comprising experts across the spectrum, from oil exploration to tidal flow generation. The Panel will advise on direction and capability needs for future energy R&D. The focus of the Panel is renewable energy sources. The Panel is already working with other science and energy groups to promote education and understanding about energy issues and the opportunities available.

4.1.4 Committees

As well as housing an Academy, the Society is a federation of S&T professional societies. The Society combines resources with the Academy to form action-orientated committees which represent the intellectual backbone of the Society. Current committees and panels are:

- Antarctic Sciences
- Astronomy
- Biodiversity
- Education
- Geosphere-Biosphere
- Human Resources
- Mathematical & Information Sciences
- NZ Climate
- Primary Resources
- Research animal care
- Social Sciences
- Sustainable Energy
- Technology.

The Society will review its committee structure and function, seeking greater contribution of each committee to the 2006-2011 Strategic Plan.

4.2 Science Direction, Funding And Career Structure

These are the key activities from 2006-2011:

4.2.1 Funding

The Society will continue to work closely with the Marsden Fund Council to grow the funding for this committee and provide high quality support for its activities. The Society will work with scientific institutions to develop the case for lifting New Zealand’s R&D expenditure above the OECD average.

4.2.1.1 Marsden Fund

The Marsden Fund is administered by the Society under a contract to government and a Memorandum of Understanding with the Marsden Council. The fund develops research capability in our best and most productive people and acts as a strong source for the new ideas. The Fund has grown from \$5.5 million in 1995 to \$38.2 million in 2005. Since 2000, the annual number of applications has risen from 756 to 897, and the number of contracts administered and monitored each year has risen from 330 to 400 (estimated for 2005/6). Over the same period, evaluation and reporting requirements have tripled. The size of the Fund could be doubled and still fund only those projects rated among the top 20 % in the world. We plan to seek funds and increase staff to grow the Fund to \$60 million by 2009.

4.2.1.2 International joint funding

We propose that new funds be allocated, in partnership with international funding agencies, to jointly fund collaborative basic research projects. Initially, this is hoped to be with a German science funding agency, and will support projects where there is a significant joint effort by researchers of both countries. The benefits will include the ability for our researchers to be involved on an equal basis in international research initiatives; better access to specialised research facilities, knowledge and skills; and the opportunity for to work overseas for significant periods of time.

4.2.1.3 James Cook research fellowships

The James Cook Research Fellowships allow a small number of our best researchers to concentrate on their chosen research for two or three years. We will seek funds to support 12 fellows and take the overall fund to \$2.5 million, with a concomitant increase to administer the fund.

4.2.1.4 Business investment in research

The Society will examine novel ways of increasing funding from business sources as new investment in research in New Zealand.

4.2.2 Career Structure And Support

We support the professions involved in S&T and encouraging our members and constituent organisations to act as leaders and models in using S&T knowledge. We are particularly active through Society committees (ca. 20 workshops/meetings per year), our international linkages, and publishing.

Concerns over the ageing population of scientists and the long lead time to develop new researchers have led to a general concern over an impending loss of human capability from the science system. We need to investigate the validity of these concerns, both in terms of the demographic distribution and the effect of the move away from basic science. We also need to investigate within these organisations the effectiveness of the ongoing, intergenerational transfer of knowledge. There needs to be special consideration of the small working group sizes prevalent in New Zealand institutions.

We need to actively build the level of interest by young Māori in science and technology. The Education Committee will continue to review mechanisms to support and encourage Māori and Pasifika peoples into science, engineering and technology at school and tertiary levels.

4.2.3 International activities

New Zealand must engage with the best scientists worldwide if researchers are to remain at the forefront of world-class science. The Society appreciates that the Ministry is developing new policies and approaches to international relations. We wish to play a considerably stronger strategic role, in support of, and in conjunction with, government's own aspirations in this area. We propose to support the Ministry's own objectives and work programme by expanding the ISAT contestable fund by 20 % each year, and by expanding the Co-lab website.

4.2.4 Royal Society funds and awards

The Marsden and James Cook Funds provide resources for our top researchers and the Royal Society medals honour the exceptional. Our Academy Council recognises and puts to work for New Zealand the excellence embodied in the Fellows of the Royal Society. The Society will invest some \$70,000 of its resources per year in supporting excellence via several individual *funds*:

- **Benson Fund** for geological maps or other scientific illustrations
- **Charles Fleming Fund** for travel to scientific meetings and research support
- **Mappin Fund** for botanical investigations in the field
- **Skinner Fund** for Maori and other Polynesian humanities and social research
- **Travel Grants** for PhD students to attend their first overseas scientific conference.

The Society will raise the profile of its Academy and its medals and awards to recognise and encourage achievement in a broad range of scientific and technological areas (including engineering, applied and social sciences), incorporating recognition at all stages of scientific careers from tertiary study through to senior research scientists.

4.2.5 Best Fit Structures for Research

The Society will investigate and make recommendations on the structures and funding arrangements that best fit the New Zealand situation. This structure must consider the balances between CRI and university funding for research and between blue skies compared to focussed outcome research.

4.3 Education

Our education programmes are fundamental to achieving the Society's objectives, particularly support and development of a highly trained and skilled research and technology work force, and development of public awareness.

As required by our Act, our current programmes span a wide spectrum. As part of the review of our activities by the Education Committee, consideration will be given to the need for preparation of teaching, learning and assessment resources and our relationship with the professional subject associations.

In 2006, the Education Committee of the Society will lead an initiative to focus on the most appropriate niche to occupy in the education sector. This review may assist the Society in future tenders to the Ministry of Education to provide a wider range of opportunities for teachers and students in school

years 2006-08 to increase professional support for teachers. The activities described below illustrate the diversity of our current programmes:

4.3.1 Reviewing Education Programmes

Motivated teachers are critical to successful learning by children. We help teachers to expand their knowledge, skills and attitudes, and use of new resources around them. The Education Committee needs to review both the financial support for, and the effectiveness of each of the initiatives below:

4.3.1.1 Teacher support

The Society will continue to manage the NZ Science Mathematics and Technology Teacher Fellowship scheme to the same high standard of delivery. Professional development will be provided through the 'Sharing the Learning' programme of in-service courses and the 'StL' website.

4.3.1.2 Students

We need to increase the number of school-leavers choosing to include S&T in their studies at university to meet the demands of a twenty-first Century economy for highly-skilled people. The Education Committee will

- consider the factors influencing the choices made by school-leavers
- develop materials showing the value of science to society;
- investigate ways to increase the reach and depth of education and communication programmes (within resource limitations)

4.3.1.3 Young achievers

We will strengthen our Young Achievers programme by introducing web interactivity and increasing the number of young people benefiting from participation in international science and technology events, and extending such opportunities to the tertiary level, such as the Lindau Nobel meeting. Over 70 students travelled overseas in 2005.

4.3.1.4 Olympiads

The Olympiads form a key component of the training of future top quality scientists. There are eight Olympiads in sciences and technology in which New Zealand could participate, but there has not been sufficient financial support to allow this. The Society will continue to advocate for Government support and centralised administration for this programme.

4.3.1.5 CREST

Creativity in Science and Technology is a national awards scheme that provides Year 6-13 students with experience in scientific or technological investigation. We need to examine student uptake and outcomes of this programme to guide us in the implementation of CREST by schools. We will complete the implementation of CREST-online in 2006 sponsored by Todd Foundation, and undertake a new 3 year initiative (under contract to the Ministry of Education) to promote the use of CREST in extension classes and programmes for the gifted and talented.

4.3.1.6 Waterways

The LEOTC National Waterways Project (NWP) provided water monitoring activities to schools for use in their local rivers, streams and lakes, helping thousands of students to develop positive attitudes towards freshwater resources. The NWP, with its focus on kaitiakitanga, currently has strong appeal to Māori communities and some of the materials are in te reo Māori. NWP has grown into EMAP (Environmental Monitoring and Action Project) which incorporates NWP and the GLOBE (Global Learning and Observations to Benefit the Environment). Under the 3.5 year contract with the Ministry of Education, we will establish EMAP in 2006 for New Zealand schools using regional facilitators and Beacon Schools.

4.3.1.7 BP Challenge

The BP Challenge, sponsored by BP New Zealand, challenges teams to design and develop 'solutions' to problems, allowing students to develop team building and social skills, while enjoying their problem-solving activities. The Education Committee will survey teachers to find out how it is used and the student learning that it provides, and will use our findings to further develop the programme.

4.3.1.8 BAYERboost

The BAYERboost scholarships for senior secondary and undergraduate students provide financial support for future studies as well as work experience in an area of interest. Within our 3 year agreement with Bayer New Zealand, the Education Committee will continue to develop a more inclusive programme providing a wider range of work experience to more students.

4.3.2 Tertiary Students

Our experience in 2005 of sending three PhD students to attend the Lindau Nobel meeting in Germany has demonstrated the value of involvement in such international events. The New Zealand scholars have exchanged ideas with emerging and iconic researchers, and broadened their networks considerably. RSNZ will continue to seek support for such activity

4.3.3 Subject Associations

Subject associations are vital to the quality delivery of curriculum in New Zealand schools. They enable teachers to learn from their colleagues and to contribute to quality teaching in specific curriculum areas. The Society currently supports subject associations in sciences, mathematics, social sciences and technology, and works on particular projects with the NZ Association of Science Educators. We aim to increase the level of support that can be offered to subject associations within the ambit of our Act to enable them to focus more on professional issues.

The Society will continue to partner with the NZASE in the production of the NZ Science Teacher. We will also support a number of subject association conferences.

We will also use the findings from our Ministry of Education commissioned stock-take of subject association capability to advocate for Governmental support for all of these crucial components of professional learning communities.

4.4 Communication of Science

There is a clear demand for credible communications to many audiences about science. The Society will review its communications strategy with a view to strengthening our communications in a number of areas, as well as considering the relationship between some of our current initiatives and the Education portfolio:

- Communication with constituents and branch organisations
- Higher profile communication of our major programmes
- Training more scientists in communications and creating opportunities for scientists to talk directly with stakeholder groups and the general public (eg. through a "Talking Technology" series of dialogues)
- Events to reach out to non-scientific audiences, and extend our networks into business, the arts, media and other professional groups.

4.4.1 Expanding Awareness

A key finding of MoRST's 2005 Research Report: *Science and the General Public* is that "The majority [of the public] would expect to access information from a professional scientific source".

The Society will undertake a number of multi-faceted public education promotions through to 2009, including Big Science Adventures (2005/6), Are Angels OK? (2005/6), International Polar Year (2007), the Centennial of The Origin of Species (2008) and a focus on economics (50th anniversary of the Philips curve) in 2008. These programmes will also provide opportunities for public dialogue on related issues.

For reaching any significant number of New Zealanders, our main options are the press, radio and TV. Websites and discs are important ways of providing information and eliciting response, but only highly motivated New Zealanders will choose to visit or use them to obtain information.

4.4.2 The Science - Business Interface

We have teamed with NZTE to further develop and implement *Once Upon a Leader*, a leadership model from the stories of contemporary business leaders. Our Science to Business Communications Course will enable real communication between scientists and business people.