



Australian Government

Australian Research Council

Federation Fellowships

**Funding Rules for Funding commencing in
2005**

Australian Research Council
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Ethics

All research proposals should conform with the principles outlined in the Joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997) (at <http://www.nhmrc.gov.au/issues/researchethics.htm>) and, as applicable, the principles outlined in the NHMRC's National Statement on Ethical Conduct in Research Involving Humans (at <http://www.nhmrc.gov.au/publications/synopses/e35syn.htm>) and the principles outlined in the NHMRC's codes on animal research (at <http://www.nhmrc.gov.au/issues/animalethics.htm>).

Acknowledging ARC support

The ARC expects that research funded by the ARC will be appropriately acknowledged.

When, at any time during or after completion of a Project, the institution, organisation or researcher publishes material, books, articles, television or radio programs, newsletters or other literary or artistic works which relate to the Fellowship, the institution, organisation or researcher shall acknowledge, at a prominent place in the publication, the support of the ARC in a form acceptable to the ARC.

Advice on acceptable forms of acknowledgement and use of the logo is provided on the ARC website at www.arc.gov.au.

Acronyms

The following acronyms are used in ARC Funding Rules.

AEST	Australian Eastern Standard Time
AIMS	Australian Institute of Marine Science
ANSTO	Australian Nuclear Science and Technology Organisation
APA	Australian Postgraduate Award
APAI	Australian Postgraduate Award (Industry)
APD	Australian Postdoctoral Fellowship
APDC	Australian Postdoctoral Fellowship (CSIRO)
APDI	Australian Postdoctoral Fellowship (Industry)
APF	Australian Professorial Fellowship
ARC	Australian Research Council
ARCIF	Australian Research Council International Fellowship
ARF	Australian Research Fellowship
AVCC	Australian Vice-Chancellors' Committee
CI	Chief Investigator
COE	College of Experts
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DSTO	Defence Science and Technology Organisation
ECR	Early Career Researcher
GA	Geoscience Australia
GAMS	Grant Application Management System
GST	Goods and Services Tax
HECS	Higher Education Contribution Scheme
KCTR	Key Centre for Teaching and Research
LASP	Learned Academies Special Projects
LIEF	Linkage Infrastructure Equipment and Facilities
LIF	Linkage Industry Fellowship
NCGP	National Competitive Grants Program
NHMRC	National Health and Medical Research Council
PI	Partner Investigator
QEII	Queen Elizabeth II Fellowship

RC-ATSI	Research Cadetship-Aboriginal and Torres Strait Islander
RIEF	Research Infrastructure Equipment and Facilities
SPIRT	Strategic Partnerships with Industry – Research and Training
SRC	Special Research Centres
URL	Universal Resource Locator

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1. Introduction

The Australian Research Council's *Federation Fellowships* are innovative and highly prestigious awards designed to attract and retain outstanding researchers to Australia and to build and strengthen world-class research capacity in Australia. By providing an internationally competitive salary, the Federation Fellowships support researchers of international renown to undertake and lead ground-breaking research of significant national economic, environmental or social benefit. Federation Fellowships will contribute to the Australian innovation system, developing strong links among researchers, industry and the international research community.

Open to applications from outstanding international researchers, *Federation Fellowships* particularly encourages applications from Australian and non-Australian researchers currently working overseas.

A clear preference will be given to early- to mid-career researchers who will play a leadership role in building Australia's internationally-competitive research capacity.

Up to 25 *Federation Fellowships* with a standard tenure of five years will be awarded for funding commencing in 2005. The Fellowships are available for tenure at Australian higher education institutions ('institutions') and Australian research organisations that are funded primarily for research from State or Commonwealth Government sources ('organisations').

This document sets out the funding rules under the *Australian Research Council Act 2001* for *Federation Fellowships*. These Funding Rules are written on the basis that it is the researcher who is the applicant. However, grants from the ARC are made to institutions or organisations, not to the individual researchers.

2. Objectives

Federation Fellowships reflects the Australian Research Council's commitment to support excellence in research by attracting world-class researchers to key positions, and creating new rewards and incentives for the application of their talents in Australia.

Federation Fellowships aims to:

- attract and retain outstanding researchers of international renown;
- build and strengthen world-class research capability in Australia;
- expand Australia's knowledge base by supporting ground-breaking, internationally competitive research;
- forge strong links among researchers, industry and the international research community; and
- support research that will result in economic, environmental, social or cultural benefits for Australia.

3. Description

3.1. Types of research supported

Federation Fellowships supports excellent research including:

- pure basic research which is experimental and theoretical work undertaken to acquire new knowledge without looking for long-term benefits other than the advancement of knowledge;
- strategic basic research which is experimental and theoretical work undertaken to acquire new knowledge directed into specified broad areas that are expected to lead to useful discoveries. It provides the broad base of knowledge necessary to solve recognised practical problems; and
- applied research which is original work undertaken primarily to acquire new knowledge with a specific application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives.

3.2. National Research Priorities

The Minister for Education, Science and Training has designated the following areas as national research priorities for the 2005 funding round:

Research Priority 1: An Environmentally Sustainable Australia

Research Priority 2: Promoting and Maintaining Good Health

Research Priority 3: Frontier Technologies for Building and Transforming Australian Industries

Research Priority 4: Safeguarding Australia

These areas of research will be referred to as Designated National Research Priorities. Within each Research Priority is a number of Priority Goals which are listed below:

Research Priority 1: An Environmentally Sustainable Australia

Priority Goals

- PG 1 Water – a critical resource
- PG 2 Transforming existing industries
- PG 3 Overcoming soil loss, salinity and acidity
- PG 4 Reducing and capturing emissions in transport and energy generation
- PG 5 Sustainable use of Australia's biodiversity
- PG 6 Developing deep earth resources
- PG 7 Responding to climate change and variability

Research Priority 2: Promoting and Maintaining Good Health

Priority Goals

- PG 1 A healthy start to life
- PG 2 Ageing well, ageing productively
- PG 3 Preventive healthcare
- PG 4 Strengthening Australia's social and economic fabric

Research Priority 3: Frontier Technologies for Building and Transforming Australian Industries Priority Goals

- PG 1 Breakthrough science
- PG 2 Frontier technologies
- PG 3 Advanced materials
- PG 4 Smart information use
- PG 5 Promoting an innovation culture and economy

Research Priority 4: Safeguarding Australia

Priority Goals

- PG 1 Critical infrastructure
- PG 2 Understanding our region and our world
- PG 3 Protecting Australia from invasive diseases and pests
- PG 4 Protecting Australia from terrorism and crime
- PG 5 Transformational defence technologies

Full descriptions of these Designated National Research Priorities and their associated Priority Goals can be found in Appendix 1, and on the ARC web site (www.arc.gov.au).

4. Eligibility

4.1. Eligibility criteria for Federation Fellows

Successful applicants will be distinguished researchers who are at the forefront of international research. They will have leadership skills and experience in building research capacity, and will propose ground-breaking research programs likely to deliver significant economic, environmental, social and cultural benefits to Australia.

Federation Fellowships is open to applications from qualified researchers currently working in Australia or overseas, and particularly encourages applications from Australian researchers currently working overseas and non-Australian researchers currently working overseas.

A clear preference will be given to early- to mid-career researchers who will play a leadership role in building Australia's internationally-competitive research capacity.

Up to five *Federation Fellowships* may be awarded to researchers who are not Australian citizens or permanent residents, but who can demonstrate that the Fellowship would be of national benefit to Australia. These applicants should demonstrate special expertise, extensive skills or exceptionally high performance levels, and the ability to build Australian research capacity by facilitating the transfer of critical knowledge to Australia and Australians.

Federation Fellows must reside predominantly in Australia for the full term of the Fellowship. If a successful applicant does not have permanent resident status he/she must obtain temporary resident status from the Department of Immigration and Multicultural and Indigenous Affairs before taking up the Fellowship.

Although applicants are required to reside predominantly in Australia, it is expected that the holders of Federation Fellowships will pursue research that is at the international leading edge in their field. To

facilitate this aim, Federation Fellows may undertake periods of research overseas. The option of approved periods overseas for Federation Fellowship holders is available when the applicant clearly demonstrates this is in the best interests of the research and its outcomes, and of national benefit to Australia. Periods overseas of up to two years in total during the period of award may be approved.

Federation Fellowships are tenable only on a full-time basis at Australian higher education institutions and other Australian research organisations funded primarily for research from State, Territory or Commonwealth Government sources, such as DSTO and CSIRO.

Researchers supported by the NHMRC are eligible to apply for Federation Fellowships subject to the above conditions of tenure. However, the ARC does not support clinical research in either medicine or dentistry (see Item 5.3).

Individual researchers with both continuing and non-continuing appointments are eligible to apply for Federation Fellowships. Successful applicants are normally required to relinquish their existing positions before taking up the Fellowship.

Federation Fellows are expected to work full-time on research and research capacity-building activities. While a Fellow's principal duty is to undertake research, it is also important to specify the role he/she would be expected to play within the administering institution or organisation. Research capacity-building activities could include research leadership in teams and centres and supervision of postgraduate students, but do not include a major role in administration.

4.2. Number of grants and applications

In any one year, the ARC will consider no more than one application for a Federation Fellowship from any one researcher, regardless of any variation in the proposed administering institution or organisation. This condition does not apply if a second round of applications is sought in the same calendar year.

4.3. Start-up Project Grant

Successful applicants who for a period of at least three years immediately prior to the closing date for applications:

- have had their place of work and place of residence outside Australia; and
- have not been eligible to be a Chief Investigator in both the ARC *Discovery Projects* scheme and the ARC *Linkage Projects* scheme

are eligible to receive a start-up project grant in addition to salary support.

5. Funding

5.1. Funding provided

Successful Federation Fellows will attract salary commensurate with internationally competitive salaries to help attract and retain key researchers in Australia. At \$A241,224 per annum (2004 dollars) plus 26% on-costs, these Fellowships provide salaries substantially higher than those payable under other Fellowship Schemes in the ARC's National Competitive Grants Program.

The Federation Fellowships have a standard tenure of five years.

In addition to salary support, the ARC may provide some successful applicants with a start-up project grant of up to \$400,000. An applicant must describe and justify in their application the amount of any start-up support requested from the ARC.

The amount of any start-up project grant and when it is given to a successful applicant is at the absolute discretion of the ARC.

5.2. Administering Institutions or Organisations

The administering institution or organisation will be required to certify its agreement to provide a high level of support, including facilities, access to support requirements such as qualified technicians, all library services and any equipment necessary for the conduct of the research. Administering institutions or organisations will be required to show their commitment to the Fellow by providing a detailed submission for their contributions towards the Fellowship which could include cash and in-kind support (Part E of the application form).

The package of administrative support and facilities must be adequate and appropriate to support the research plan put forward in the application. The commitment of funds for postgraduate students and post-doctoral researchers to work with the Federation Fellowship holder should form a significant part of the package of matching support.

The level of guaranteed support at least must match the financial assistance (in salary) provided by the Commonwealth over the life of the Fellowship. There is no requirement for matching funding with respect to any start-up project grant offered by the ARC to successful applicants.

5.3. Areas of investigation/work not supported

Federation Fellowships does not support the following work:

- clinical medical and dental research;
- activities leading solely to the creation or performance of a work of art, including visual art, musical compositions, drama, dance, designs and literary works, for which Commonwealth Government support is provided through the Australia Council for the Arts;
- scholarly investigations that, while important in themselves, do not lead to conceptual advances or discoveries, or to novel practical outcomes or applications. Projects such as uncritical biographical compilations and purely descriptive catalogues or editions that do not involve original research are not funded;
- production of teaching materials, even though some research may be involved in their production;
- compilation of data, unless an integral part of a project, in which case applicants must provide a statement indicating the research objectives to which the data would contribute;
- development of research aids and tools (including computer programs), unless they form an integral part of a project, in which case applicants must provide a statement indicating the research objectives to which these activities would contribute.

6. Cross-program funding

Successful applicants will be required to relinquish any current Fellowships before accepting a Federation Fellowship. This applies to all ARC Fellowships and any other Fellowship held from another funding body.

Federation Fellowship holders are eligible to hold the maximum number of grants in all other ARC schemes. This includes (but is not exclusive to) two *Discovery Projects* and four concurrent *Linkage Projects* grants and four concurrent *Linkage Projects* which have funding for APAs only.

Directors of Research Centres, including ARC Centres of Excellence, Special Research Centres and Key Research Centres, are eligible to apply for the Federation Fellowships. A Federation Fellow may serve as a Centre Director or Centre Executive Research Director, provided that the ARC is satisfied that he/she will work full-time on research and research capacity-building activities.

7. Application process

7.1. Applications

Applicants must submit their proposal as a mature plan ready for implementation. The application must contain all the information necessary for assessment of the project without the need for further written or oral explanation, or reference to additional documentation unless requested by the ARC. All details in the application must be current at the time of submission.

Applications must not be marked commercial-in-confidence as they cannot be assessed under the ARC procedures for peer assessment.

7.2. Referees' Reports

Applicants must nominate at least three and no more than five referees, who have agreed to provide a confidential report to the ARC. The quality and standing of the referees as well as their comments will be taken into account in the assessment of applications.

Applicants will need to provide the name and contact details, including an email address, for each of their nominated referees. The ARC will ask nominated referees to provide an assessment of the application against the selection criteria direct to the ARC.

The ARC may seek reports from referees other than those nominated by the applicants (see Item 8.2).

7.3. Certification

It is the responsibility of the administering institution or organisation to obtain the signature of the participant named at Part B of the application form. The signature is to be retained by the administering institution or organisation which must provide these certifications if requested. A pro forma is available for this purpose on the ARC web site (www.arc.gov.au).

7.4. Submission of applications

Applications under *Federation Fellowships* consist of three parts:

- 1 Application form (including Referees' contact details): to be completed in Grant Application Management System (GAMS)
- 2 Additional text: Sections B8, C2 and Part D; and supporting documentation Part E

7.4.1. Application format

All documents must be written in English and must comply strictly with the format and submission requirements.

All pages should be in black type, using a single column and 12-point font size on white A4 paper, printed on one side only and unbound, with at least 2 cm margins on each side. As applications are scanned electronically, applicants must use a highly legible font type, such as Arial, Courier, Palatino, Times New Roman and Helvetica. Variants such as mathematical typesetting languages may also be used. References may be reproduced in 10-point font size. Colour graphs or colour photographs may be included but they will be reproduced in black and white and the reproduction quality may be degraded.

7.4.2. Application form and instructions to applicants

Applicants must use the application form produced by GAMS at the ARC web site (www.arc.gov.au).

The application form is organised into five modules:

Part A Administrative summary

Part B Personnel

Part C Research Support

Part D Description of Project/Program of Research

Part E Description of Facilities and Support by Administering Institution or Organisation

Applicants should note that a separate document, *Federation Fellowships: Instructions to Applicants for Funding Commencing in 2005*, is available from www.arc.gov.au to assist in preparing applications.

7.4.3. Number of copies

An original and **one identical** paper copy only are required. The application must be clipped with NAL clips, not stapled. The application form should be submitted with the additional text, including supporting documentation, interleaved appropriately and the pages numbered sequentially starting at the beginning of the application (see *Federation Fellowships: Instructions to Applicants for Funding Commencing in 2005*).

7.4.4. Closing date for applications

Paper originals of the applications for *Federation Fellowships* must be received by the ARC, and the application form, completed using GAMS, must be submitted by 5.00 pm (AEST) **Friday 15 October 2004**. Applications may be withdrawn but may not be changed after submission. Additions, deletions and modifications will not be accepted after submission. Applications received after 5.00 pm (AEST) **Friday 15 October 2004** will not be accepted.

7.4.5. How to complete and submit applications

Federation Fellowships application forms are produced using the ARC's web-based GAMS. Applicants applying through a university should submit their applications through the Research Office by the university's closing date. University Research Offices have access to GAMS and will allocate GAMS UserIDs and passwords to enable applicants at their university to access the system and create

application forms. If an applicant has previously been allocated access to GAMS, his/her UserID and password should still be current.

Researchers applying through organisations other than higher education institutions should complete their application forms using GAMS. Organisations should identify a GAMS Contact who should contact the ARC directly. The ARC will assist the GAMS Contact to gain access to the system and to create applications. University Research Offices and other administering organisations should submit the application form in GAMS and forward the full paper application. Applicants who require an alternative means to submitting the form on-line should contact their university's Research Office or the GAMS Contact in organisations other than universities.

Applications should be sent :

by mail, to
Co-ordinator
Federation Fellowships
Disciplines and Programs
Australian Research Council
GPO Box 2702
CANBERRA ACT 2601

or

by courier, to
Co-ordinator
Federation Fellowships
Australian Research Council
Geoscience Australia Building
cnr Jerrabomberra Ave and Hindmarsh
Drive
SYMONSTON ACT 2609

8. Selection and approval process

8.1. Selection criteria

The selection criteria for Fellowships are:

- **Investigator** **(50%)**
 - outstanding research track record
 - leadership ability to build world-class research capacity
- **Project/Program of research activity** **(30%)**
 - significance and innovation
 - does the research address an important problem?
 - how will the anticipated outcomes advance the knowledge base?
 - are the project aims and concepts novel and innovative?
 - will new methods or technologies be developed?

- approach
 - are the conceptual framework, design, methods and analyses adequately developed, well integrated and appropriate to the aims of the project?
- appropriateness of support in matching funds
 - is the package of administrative support and facilities adequate to support the research plan put forward in the application?
 - does the package include funding for postgraduate students and post-doctoral researchers to work with the Federation Fellow?
- **National benefit** **(20%)**
 - how will the research build world-class capacity in Australia ?
 - what is the potential for the research to contribute to the Designated National Research Priorities?
 - how does the research program enhance innovation in Australia?
 - is the project/program likely to expand Australia's knowledge base and research capability?
 - does the project/program build and sustain a world-class research team and linkages?
 - what is the potential of the research project to result in economic, environmental, social and/or cultural benefits for Australia from the expected results and outcomes of the project?

Institution or organisational support

The strength of institutional or organisational commitment will be a determining factor in the granting of Federation Fellowships. A statement detailing the support that the institution or organisation will be providing is necessary (Refer to section 4.1 and Part E of application form).

Designated National Research Priorities

A preference may be exercised in favour of applications lying in the Designated National Research Priorities.

8.2. Assessment and selection procedure

Assessment of applications is undertaken by the ARC's Federation Fellowships Committee, which has the right to make decisions solely on the basis of its expertise, and which may:

- exclude ineligible applications;
- seek reports from referees nominated in the application;
- seek reports from referees other than those nominated by the applicants;
- seek advice from members of the ARC's College of Experts;
- rank each application relative to the others on the basis of the application, referees' reports and advice from members of the ARC's College of Experts;
- assess and recommend budgets; and
- prepare funding recommendations that are submitted to the ARC Board.

The ARC has procedures for managing any institutional/organisational and personal conflicts of interest experienced by Committee members, and for enabling members to withdraw from the assessment process of particular applications.

8.2.1. Exclusion

Exclusion of ineligible applications by the ARC may take place at any time during the selection process. Applications which contravene the Funding Rules in any material way may be excluded. Grounds for exclusion include, but are not limited to:

- failing to submit the application through the appropriate Research Office/Chief Executive Officer for certification;
- exceeding the limits on the number of applications permissible;
- not meeting the eligibility criteria;
- providing incomplete, inaccurate or misleading information (refer to 11.4); or
- designating all or any part of the application as ‘commercial-in-confidence’.

8.2.2. Recommendations

The Committee’s recommendations are submitted to the ARC Board and, subject to its views, to the Minister for Education, Science and Training for approval.

8.2.3. Ministerial approval

A recommendation from the ARC Board is sent to the Minister for consideration. The Minister determines which applications will be offered funding.

8.3. Offer of Fellowship

Following the Minister’s approval, the ARC will inform the successful administering institution or organisation in a letter of offer that will indicate any special conditions that may apply, such as temporary overseas residency.

A Fellowship may not begin, nor may funding assistance be expended, before the Funding Agreement is signed by the administering institution or organisation and the ARC.

9. Appeals process

Appeals will be considered only against process issues and not against committee recommendations or assessor ratings and comments. Appeals must be made on the appeals form available from the ARC website (www.arc.gov.au).

The form must be lodged through the Administering Organisation’s Research Office, and be received within 28 days of the date on the letter notifying the outcome of applications, by:

The Appeals Officer
Australian Research Council
GPO Box 2702
CANBERRA ACT 2601

10. Administration of Funding

10.1. Funding Agreement

Successful applicants should familiarise themselves with the Funding Agreement. They must accept the terms of the Funding Agreement and the administering institution or organisation must sign the Funding Agreement before funds can be paid.

Fellowships must commence as required by the Funding Agreement. Failure to do so will result in termination of funding.

Administering institutions and organisations should note that the Funding Agreement covers the post-award management including reporting requirements and financial management. The draft Funding Agreement can be viewed on the ARC website (www.arc.gov.au).

10.1.1. Varying the Funding Agreement

Requests to vary the Funding Agreement must be forwarded in writing by the institution's or organisation's Research Office, or equivalent, to the ARC. Forms are available for variation requests on the ARC website (www.arc.gov.au).

10.1.2. Varying the Funding Approval

Requests to vary the Funding Approval must be forwarded in writing by the administering institution's or organisation's Research Office to the ARC. The Funding Approval may be varied where:

- the institution's or organisation's involvement with the research program ends or substantially changes;
- the research program changes so that it is no longer consistent with the description in the Funding Approval;
- any of the collaborating partner institutions or organisations involved in the research program end or substantially change their involvement with the program.

10.1.3. Reports

Administering institutions and organisations are required to submit reports concerning funded projects to the ARC, in the format and by the due dates detailed in the Funding Agreement.

11. Other matters

11.1. Applicable law

The ARC is required to comply with the requirements of the *Privacy Act 1988* and the *Freedom of Information Act 1982*. Information about the *Privacy Act 1988* is available at <http://www.privacy.gov.au/act/index.html>

11.2. Confidentiality

Information contained in applications is regarded as confidential unless otherwise stated and, subject to the need to provide applications to assessors, and statutory requirements for the ARC to provide

information to Parliament and other organisations, applications will be received and treated as confidential.

Notwithstanding the above, the ARC may publicise and report offers or awards of funding, including information about the proposed research, the name and institution or organisation of any applicant, the identity of the administering institution or organisation, and any other institution or organisation involved in the project, the title and summary descriptions of the project and its intended outcomes, and the level and nature of financial assistance from the ARC.

11.3. Intellectual property

Applicants must agree to comply with the National Principles of Intellectual Property Management for Publicly Funded Research (available at www.arc.gov.au) and act in accordance with any intellectual property policies of the applicant's institution or organisation.

11.4. Incomplete or misleading information

It is a serious offence to provide false or misleading information to the Commonwealth.

If an application is incomplete, inaccurate or contains misleading information, it may be excluded from any further consideration for funding.

If the ARC believes that omissions or inclusion of misleading information are intentional, or if there is evidence of malpractice, the ARC will refer the matter for investigation with a view to prosecution under Commonwealth criminal law. The Australian Government is committed to protecting its revenue, expenditure and property from any attempt, by members of the public, contractors, sub-contractors, agents, intermediaries or its own employees, to gain financial or other benefits by deceit.

Examples of malpractice include, but are not restricted to:

providing fictitious track records; or

falsifying claims in publications records (such as describing a paper as accepted for publication when it has only been submitted).

11.5. Insurance and liabilities

Institutions and organisations are subject to the liability, indemnity and insurance provisions of the Funding Agreement. The draft Funding Agreement can be viewed on the ARC website (www.arc.gov.au).

11.6. Contact points

For further information, the institution or organisation's Research Office should be contacted in the first instance. Enquiries about *Federation Fellowships* may be addressed to:

Federations Fellowships Program Coordinator

Disciplines and Programs

Australian Research Council

GPO Box 2702

CANBERRA ACT 2601

Email: ncgp@arc.gov.au

Phone: + 61 2 6284 6600

Fax: + 61 2 6284 6638

Web: www.arc.gov.au

Appendix 1. Descriptions of Designated National Research Priorities and associated Priority Goals

Research Priority 1: An Environmentally Sustainable Australia

Transforming the way we utilise our land, water, mineral and energy resources through a better understanding of human and environmental systems and the use of new technologies

Natural resources have traditionally fuelled our national and regional economies. They have the potential to generate further wealth and employment opportunities in the future. But our natural resources and biodiversity must be used on a sustainable basis so that the benefits continue to be enjoyed by future generations.

Australia faces significant environmental challenges:

Efficient and sustainable water use is a critically important issue for our economic and social development;

Significant land degradation issues, such as salinity, need to be arrested to underpin our agricultural production systems;

Climate change can be expected to have complex, long-term consequences for the environment, for our agricultural and marine production systems and for communities; and

The cleanliness and efficiency of our energy production systems should be enhanced.

There is substantial effort underway to develop more efficient water utilisation practices, to protect our rivers and groundwater resources, and to protect and remediate our fragile soils.

Our agricultural and mining industries are being transformed through the adoption of new technologies, and the development of new types of foods.

This will help to revitalise our regional communities and generate substantial export earnings for the nation over the coming decades.

The Government is committed to meeting the greenhouse gas emissions target set for Australia at Kyoto.

Australia is well placed to take an international lead in developing new and improved energy technologies and in capturing and 'sequestering' carbon dioxide.

Other opportunities lie in managing and using our unique, rich land- and marine-based biodiversity, and in developing our deep earth resources.

Australia has a strong record of achievement in research in fields in the natural sciences, such as agriculture, natural resource management, climate change, horticulture, forestry, mining, energy, and marine sciences, as well as in the social sciences and humanities.

We must build on these strengths to improve our competitive advantages while enhancing our understanding of natural systems and the interplay of human activities.

In particular, there needs to be an increased understanding of the contributions of human behaviour to environmental and climate change, and on appropriate adaptive responses and strategies.

To understand and manage these complex interactions better will require significant collaboration within the research community and with other stakeholders.

Priority goals for research fall in the seven areas of water utilisation, transforming resource-based industries, overcoming land degradation, developing cleaner, more efficient fuels and energy sources, managing biodiversity, deep earth resources and responding to climate change and variability.

Priority Goals

- **Water – a critical resource**

Sustainable ways of improving water productivity, using less water in agriculture and other industries, providing increased protection of rivers and groundwater and the re-use of urban and industrial waste waters.

Australia is one of the driest continents and is dependent upon access to freshwater supplies for economic and social development. It has a complex geological structure, a highly variable climate, unique ecosystems, flora and fauna and a distinctive indigenous and settler history. Enhancing our understanding of the links between these factors and water availability will result in a better understanding of sustainable water management practices.

- **Transforming existing industries**

New technologies for resource-based industries to deliver substantial increases in national wealth while minimising environmental impacts on land and sea.

Resource-based industries underpin much of Australia's prosperity and have the potential to do so in the future. For example, Australia remains highly prospective for minerals discoveries and highly attractive for the development of new era foods from agricultural and marine sources. Our competitive advantage and national well being will depend on research and on the development and adoption of new technologies.

- **Overcoming soil loss, salinity and acidity**

Identifying causes and solutions to land degradation using a multidisciplinary approach to restore land surfaces.

The Australian landscape is fragile: soil salinity, acidity, and nutrient levels pose significant, long term challenges for agriculture and the environment. Research is helping to find solutions to these problems. For example, the National Land and Water Resources Audit shows the extent of salinity, soil erosion and soil acidification in the Australian environment and illustrates Australia's leading edge in national mapping of critical resource data. Further multidisciplinary effort is required to develop sustainable land management practices that are appropriate for Australian conditions and mitigate major land degradation processes and increase biodiversity.

- **Reducing and capturing emissions in transport and energy generation**

Alternative transport technologies and clean combustion and efficient new power generation systems and capture and sequestration of carbon dioxide.

Australia is well positioned to produce world class solutions to reduce and capture greenhouse gas emissions and the Government is committed to meeting the emissions target set for

Australia at Kyoto. We are also well placed to develop alternative energy technologies and ecologically sustainable transport and power generation systems.

- **Sustainable use of Australia's biodiversity**

Managing and protecting Australia's terrestrial and marine biodiversity both for its own value and to develop long term use of ecosystem goods and services ranging from fisheries to ecotourism.

Australia has a unique and rich flora and fauna. Many of our complex ecosystems – on which our agricultural, fisheries and tourism industries depend - have adapted to events such as drought and fire, and have been shaped by indigenous and settler management practices. There is a need for a more comprehensive understanding of these natural systems and the interplay with human activities, and the effects of management and protection measures.

- **Developing deep earth resources**

Smart high-technology exploration methodologies, including imaging and mapping the deep earth and ocean floors, and novel efficient ways of commodity extraction and processing (examples include minerals, oil and gas) while minimising negative ecological and social impacts.

Many of Australia's known mineral assets may be nearly exhausted within the next decade. New land-based deposits are believed to be buried deeper in the crust and the deep marine areas surrounding Australia are also largely unexplored. New technologies, such as remote sensing, indicate scientists are on the brink of being able to 'see' inside the earth and identify deeply buried deposits.

- **Responding to climate change and variability**

Increasing our understanding of the impact of climate change and variability at the regional level across Australia, and addressing the consequences of these factors on the environment and on communities.

Australia already has a highly variable climate, and climate change can be expected to have further significant impacts. It is important to enhance our understanding of the consequences of climate change and variability at the regional level across Australia, and the implications for the environment and for communities. It is also important to explore beneficial adaptation strategies to climate change and variability to ensure ongoing social, economic and environmental well being.

Research Priority 2: Promoting and Maintaining Good Health

Promoting good health and well being for all Australians

Average life expectancies have increased markedly in recent decades. Australians also expect to lead longer and healthier lives in the future, and to remain productive and independent over an extended period.

Enabling individuals and families to make choices that lead to healthy, productive and fulfilling lives will yield economic and social benefits and add materially to national well being.

Australians expect that their children and grandchildren should have a healthy start to life.

Developing strategies to promote the healthy development of young Australians, and addressing the causes and reducing the impact of the genetic, social and environmental factors which diminish their life potential will be critical.

A revolution is also underway at the other end of the life cycle. Australia, like many other developed nations, is undergoing a major demographic shift involving significant growth in the aged population.

To meet this challenge, it will be important to promote healthy ageing by developing better social and medical strategies to ensure that older Australians enjoy healthy and productive lives.

Informed insights into the causes of disease and of mental and physical degeneration will contribute to the achievement of this goal.

All Australians stand to benefit from preventive healthcare through the adoption of healthier attitudes, habits and lifestyles.

Evidence-based preventive interventions may help reduce the incidence and severity of many diseases, including major health problems such as cardiovascular and neurodegenerative diseases, mental ill-health, obesity, diabetes, asthma and chronic inflammatory conditions. These could include interventions that reduce exposure to contamination of the physical environment (eg air pollution).

Improvements in the health and well being of the young, of older Australians and in preventive healthcare will be underpinned by research.

However, while Australia has an enviable record in health and medical research, the research effort is spread across the many universities, hospitals and health and medical research institutes, resulting in critical mass only in limited areas of research.

There is also a need to draw on multidisciplinary approaches that include research contributions from the social sciences and humanities.

This priority is designed to promote health and prevent disease through a more focused and collaborative effort.

Priority goals for research fall in the four areas of a healthy start to life, ageing well, ageing productively, preventive healthcare and strengthening Australia's social and economic fabric.

Priority Goals

- **A healthy start to life**

Counteracting the impact of genetic, social and environmental factors which predispose infants and children to ill health and reduce their well being and life potential.

Human health in the developing foetus and in early childhood is critical to the future well being of the adult. Research shows that health and well being in early childhood is predictive of later positive outcomes, and that health in middle and late childhood is also crucial. This goal supports the Government's National Agenda for Early Childhood initiative.

- **Ageing well, ageing productively**

Developing better social, medical and population health strategies to improve the mental and physical capacities of ageing people.

Australia's population is ageing, with a significant projected increase in the number of people aged over 65 and over 85. While Australia is relatively well placed compared with many OECD nations, major shifts in cultural expectations and attitudes about ageing are necessary to respond constructively, at both an individual and population level. A healthy aged population will contribute actively to the life of the nation through participation in the labour market or through voluntary work. This goal supports the Government's National Strategy for an Ageing Australia.

- **Preventive healthcare**

New ethical, evidence-based strategies to promote health and prevent disease through the adoption of healthier lifestyles and diet, and the development of health-promoting products. Preventive healthcare research will improve the prediction and prevention of disease and injury for all Australians through the adoption of healthier behaviours, lifestyles and environments. Research will generate an improvement in the design, delivery and uptake of programmes such as exercise-based rehabilitation. There are several major disease targets amenable to immediate study, such as cardiovascular health, neurodegenerative diseases, mental ill-health, obesity, diabetes, asthma and chronic inflammatory conditions. Research on prevention will emphasise interdisciplinary approaches, including research on ethics, drawing on contributions from the social sciences and humanities, as well as from the health and medical sciences. It will also focus on developing new health promoting foods and nutraceuticals. This goal supports the Government's Focus on Prevention initiative.

- **Strengthening Australia's social and economic fabric**

Understanding and strengthening key elements of Australia's social and economic fabric to help families and individuals live healthy, productive, and fulfilling lives. Living in today's society involves a complex web of choices, yet many of the traditional support structures are weaker than they have been in the past. Enabling people to make choices that lead to positive pathways to self reliance and supportive family structures is more important than ever. The interactions between the social safety net, social and economic participation, financial incentives and community and private sources of support are critical in helping people maximise their potential and achieve good, healthy, lifetime outcomes. In the decade ahead, it will be vital to understand and support the drivers for workforce participation and the broader social and economic trends influencing Australian families and communities. This goal supports the Government's welfare reform and participation agendas. Research in this area will emphasise interdisciplinary approaches, drawing on contributions from the economic, behavioural and social sciences

Research Priority 3: Frontier Technologies for Building and Transforming Australian Industries

Stimulating the growth of world-class Australian industries using innovative technologies developed from cutting-edge research

Progress and wealth often derive from the unforeseen application of new discoveries. Australia must be at the leading edge if it is to stay abreast of international developments and take advantage of opportunities.

Our national capabilities in emerging sciences and their underpinning disciplines determine our capacity to develop and implement new technologies. Australia has a strong base of expertise, skills and technological capacities in the fundamental sciences and key technologies.

Our strengths are in a wide range of areas such as biotechnology, material sciences, information and communications technology (ICT), photonics, nanotechnology and sensor technology.

ICT is currently the critical enabling technology and is a major contributor to national productivity and growth.

But breakthrough science underpins technological advancements in many areas and Australia needs to foster an environment that stimulates creativity and innovation.

Applications for frontier technologies are potentially very large. Australia has the capacity to exploit niche markets for new products and services.

Australia also has an enviable track record as an innovator and developer of advanced materials and must grasp the opportunity to stay ahead.

Smart information use involving improved data management, intelligent transport systems and digital media to develop creative applications for digital technologies provides huge opportunities to improve the performance of key Australian industries.

Australia needs to invest in this research area as it is fundamental to our future competitiveness and well being.

This priority will help to strengthen the capacity of Australian researchers to participate in new areas of research, enhance Australia's international scientific reputation, stimulate local expertise, and help create vibrant new industries.

A better understanding of the conditions that are conducive to innovation will ensure that Australia's investment in research will maximise the benefits for Australia.

Enhanced research effort will also be achieved through initiatives that develop a critical mass of researchers in key areas.

Priority goals for research fall in the five areas of breakthrough science, frontier technologies, advanced materials, smart information use, and promoting an innovation culture and economy.

Priority Goals

- **Breakthrough science**

Better understanding of the fundamental processes that will advance knowledge and facilitate the development of technological innovations.

Breakthrough science underpins technological innovation across a range of industries critical to maintaining Australia's position as a developed country. Some examples include bio-, cultural- and geo-informatics, nano-assembly and quantum computing. Technological advances are often unexpected and a strong foundation in mathematics and the fundamental sciences will provide an environment that fosters creativity and innovation. Early participation in leading edge areas of research will enable Australian researchers to benefit more fully from international developments.

- **Frontier technologies**

Enhanced capacity in frontier technologies to power world-class industries of the future and build on Australia's strengths in research and innovation (examples include nanotechnology, biotechnology, ICT, photonics, genomics/phenomics, and complex systems).

The potential applications of frontier technologies across a range of industries in Australia are vast. Australia has significant capacity to exploit niche markets for new products and services emerging from frontier technologies. Australia has world-class research expertise in many such areas. Some examples include nanotechnology, biotechnology, ICT, photonics, genomics and phenomics. Also important are advanced frameworks such as complex systems in which these technologies are applied. Future directions in this priority area need to target the cutting-edge science critical for each emerging technology.

- **Advanced materials**

Advanced materials for applications in construction, communications, transport, agriculture and medicine (examples include ceramics, organics, biomaterials, smart material and fabrics, composites, polymers and light metals).

The development of advanced materials will underpin growth in many areas of industrial and economic activity in Australia. Australia has substantial infrastructure in this area and an enviable track record as an innovator and developer of advanced materials. The era of advanced materials is just beginning, in spite of the tremendous progress in recent years. Substantial scientific and technological challenges remain ahead, including the development of more sophisticated and specialised materials. Some examples include ceramics, organics, biomaterials, smart materials and fabrics, composites, polymers, and light metals.

- **Smart information use**

Improved data management for existing and new business applications and creative applications for digital technologies (examples include e-finance, interactive systems, multi-platform media, creative industries, digital media creative design, content generation and imaging).

ICT applications are providing huge opportunities to deliver new systems, products, business solutions, and to make more efficient use of infrastructure. Examples include e-finance, multi-media, content generation and imaging. Improved data management is central to the future competitiveness of key industries such as agriculture, biotechnology, finance, banking, education, transport, government, and health and 'info-tainment'. The ability of organisations to operate virtually and collaborate across huge distances in Australia and internationally hinges on our capabilities in this area. The media and creative industries are among the fastest growing sectors of the new economy. Research is needed to exploit the huge potential in the digital media industry.

- **Promoting an innovation culture and economy**

Maximising Australia's creative and technological capability by understanding the factors conducive to innovation and its acceptance.

Understanding the factors that lead to highly creative and innovative ideas and concepts, and the conditions that lead to their introduction, transfer and uptake is critical for any nation that aspires to lead the world in breakthrough science, frontier technologies, and in other forms of innovation. Promoting an innovation culture and economy requires research with a focus on developing and fostering human talent, societal and cultural values favourable to creativity and innovation, and structures and processes for encouraging and managing innovation.

Research Priority 4: Safeguarding Australia

Safeguarding Australia from terrorism, crime, invasive diseases and pests, strengthening our understanding of Australia's place in the region and the world, and securing our infrastructure, particularly with respect to our digital systems.

The importance of security and safety to Australia has been underscored by recent events.

Australia has to be capable of anticipating and tackling critical threats to society, strategic areas of the national economy and the environment.

The threats can potentially come from within and outside Australia.

The world is now characterised by the widespread and rapid movements of people, digitally coded data, goods and services, and exotic biological agents.

Critical infrastructure in Australia is increasingly dependent on digital technology for its management and integration.

Information protection and the integrity of security systems are now more important than ever before.

It is also necessary to protect the status of Australia as a nation free of many of the diseases affecting primary production around the world.

Terrorism has emerged as a very real global threat and crime is taking a significant toll on Australian society and economy.

Maintaining the operational advantage of Australia's defence forces through superior capabilities is also fundamental to our national security.

Enhancing our nation's understanding of social, political and cultural issues will help Australia to engage with our neighbours and the wider global community and to respond to emerging issues.

Leading edge research in Australia is already yielding high dividends and as a national research priority will improve the effectiveness of that contribution.

Stronger research capabilities will ensure that solutions are tailored to Australia's unique circumstances, reflecting its geographic features and small population.

Greater collaboration within the research community and with other stakeholders will allow us to better understand and manage potential threats to Australia.

Harnessing the knowledge and capabilities across Australia offers us the best chance of developing innovative and rapid solutions to serious threats.

Australia's international relations and its regional influence will be strengthened through new collaborative approaches and new science and technologies that enhance security and safety.

The heightened interest in personal and electronic security across the world also provides opportunities for Australian solutions.

Priority goals for research fall in the five areas of critical infrastructure, understanding our region and the world, protecting Australia from invasive diseases and pests, protecting Australia from terrorism and crime, and transformational defence technologies.

Priority goals

- **Critical infrastructure**

Protecting Australia's critical infrastructure including our financial, energy, communications, and transport systems.

Protecting our critical infrastructure is important to national security and to the social and economic well being of Australia. An important aspect of this priority goal is e-security which is an enabler of e-commerce. Maintaining a critical mass of research in e-security will be essential in providing Australia with the tools to protect our way of life.

- **Understanding our region and the world**

Enhancing Australia's capacity to interpret and engage with its regional and global environment through a greater understanding of languages, societies, politics and cultures.

Social, cultural and religious issues are of growing significance due to the insecurities of globalisation and the increasing role of non-state players in the security environment.

Australia's capacity to interpret and engage with its regional and global environment will be substantially improved by enhancing its research base in apposite languages, societies and cultures. An approach that enhances Australia's capacity to interpret itself to the rest of the world is also needed.

- **Protecting Australia from invasive diseases and pests**

Counteract the impact of invasive species through the application of new technologies and by integrating approaches across agencies and jurisdictions.

Australia is free of many of the pests and diseases affecting primary production around the world. This status needs to be protected as the introduction of exotic species has the potential to adversely affect our exports and the environment. Australia already has strong skills and expertise in this area of research and further work will offer immediate benefits to the community. A greater level of coordination of our research effort will mean that Australia can more effectively develop innovative and rapid solutions to serious threats.

- **Protecting Australia from terrorism and crime**

By promoting a healthy and diverse research and development system that anticipates threats and supports core competencies in modern and rapid identification techniques.

Protecting Australia from terrorism is now more important than ever before in light of recent events and our involvement in the 'war on terror'. The new threat requires a more sophisticated response which should harness Australia's research capabilities, and which will focus on all phases of counter-terrorism; prevention, preparedness, detection, response and recovery. Crime takes a significant toll on Australian society and economy. The June 2000 report from the Prime Minister's Science, Engineering and Innovation Council estimated that crime costs Australia at least \$18 billion per annum. Personal identification, information protection and the integrity of security systems are fundamental towards ensuring the national security of Australia. An effective solution will include building on Australia's existing strengths in rapid detection using new analytical technologies and managing significant data collections.

- **Transformational defence technologies**

Transform military operations for the defence of Australia by providing superior technologies, better information and improved ways of operation.

Australia has a small defence force to protect a large continent and a substantial maritime region of responsibility. Its operational advantage has been maintained through a superior capability which is dependent on leveraging innovative technologies. Although some benefits can be gained from overseas research, Australia has to conduct its own research to address

uniquely Australian demands. A systems approach which harnesses the research capabilities of all stakeholders is essential to the successful development and introduction of innovative technologies.