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**REVIEW COMMITTEE MEMBERSHIP**

Chair:

**Professor Deryck Schreuder**, former Vice-Chancellor and Principal, The University of Western Australia.

Members:

**Dr Tom Everhart**, former President, California Institute of Technology.

**Professor Deborah Freund**, Vice-Chancellor and Provost, Syracuse University. NY.

**Professor Franz Kuna**, former Pro Vice-Chancellor (Teaching and Research), Klagenfurt University, Austria.

**Professor Sir Colin Lucas**, Vice-Chancellor, University of Oxford.

**Ms Heather Ridout**, Chief Executive, Australian Industry Group.

**Professor Frank Shu**, President, National Tsing Hua University, Taiwan.


**Dr Jan Veldhuis**, former President, Utrecht University, The Netherlands.

**Professor Sir David Williams QC**, former Vice-Chancellor, University of Cambridge.

*The Chair of the Committee sought input from Professor Jeremy Knowles (Dean, Faculty of Arts and Sciences, Harvard University) and Dr Rita Colwell (Chair, Canon Life Sciences and former Director, National Science Foundation).*
TERMS OF REFERENCE

For a quality review of the Australian National University

The Council of the Australian National University, in accordance with its overall responsibilities for the performance of the University, has initiated an independent, external Review of the quality of its performance. The Review will comprehend research and scholarship, research training, undergraduate teaching and learning, postgraduate teaching and learning, national and regional community service, and internationalisation.

The Review is intended to inform the University and the Australian public about the standing of the ANU in the international academic community and about the best ways of developing the potential of the ANU for Australia’s longer term national interest. The Review will focus on the quality of the results achieved by the ANU through its various outputs.

The ANU Quality Review Committee will finalise a report to the ANU Council before November 2004 on the following matters:

i. the quality of ANU research;
ii. the quality of ANU research training;
iii. the quality of ANU undergraduate and postgraduate education;
iv. the impact of the ANU’s regional and national service; and
v. the strength of the ANU’s international engagement.

The Council will publish the final report of the ANU Quality Review Committee and will also make public its response to the findings and recommendations of the Committee.

1. The quality of ANU research

1.1 The Review will report on the quality of research activities, with reference to international and national benchmarks of research excellence. The review will encompass all the research activities of the university and will assess the quality of the research performed in the distinctive academic clusters of the ANU - the Institute of Advanced Studies, University Centres and The Faculties, separately and collectively. While acknowledging the separate structural components, the Committee will comment on the overall research strength of the ANU and the synergistic relationships that are developed or could be developed.

1.2 The ANU Quality Review Committee will employ peer review methods and have regard to bibliometric and other data, and the outcomes of competitive processes, for assessing the quality of research activities. In particular, the Committee will pilot the use of a research outcomes assessment exercise in the Australian context and report on its possible wider application. The views of business and public users of research in Australia will also be taken into account.

1.3 The ANU Quality Review Committee will report on:

1.3.1 the excellence of ANU research;
1.3.2 the international reputation of ANU research;
1.3.3 the national significance of ANU research;
1.3.4 the ANU’s management and development of intellectual property;
1.3.5 the quality of the ANU research environment;
1.3.6 the development of research careers of staff;
1.3.7 the strength of the ANU’s networks for research collaboration; and
1.3.8 emerging fields and inter-disciplinary areas of research of importance to the ANU.
2. The quality of research training

2.1 The Review will report on:
   2.1.1 the quality of the ANU research training environment;
   2.1.2 the quality of the research student experience; and
   2.1.3 the capabilities of research graduates.

2.2 The ANU Quality Review Committee will make use of the results of surveys and other measures of the capabilities and satisfaction levels of graduates and their employment destinations.

3. The quality of ANU undergraduate and postgraduate education

3.1 The Review will report on:
   3.1.1 the quality of ANU education at the undergraduate and graduate levels;
   3.1.2 the special character of ANU education in a research-intensive environment;
   3.1.3 innovative features of course design and delivery; and
   3.1.4 the attributes of ANU graduates.

3.2 The ANU Quality Review Committee will make use of comparative indicators of student satisfaction, and surveys of graduate satisfaction and employment destinations. The Committee will also have regard to curriculum materials, and documentation of teaching and learning practices and associated evaluations.

4. The quality of ANU service to national and regional communities

4.1 The Review will report on:
   4.1.1 the performance of the ANU as Australia’s national university;
   4.1.2 the contribution of the ANU to public debate, scientific advancement and cultural development; and
   4.1.3 the regional community benefits of the ANU.

4.2 The ANU Quality Review Committee will make use of available statistics and reports on staff participation in public discussions and advising. The Committee will also take account of the views of national and regional users of ANU services.

5. The quality of the ANU’s international engagement

5.1 The Review will report on:
   5.1.2 the quality of the international student experience;
   5.1.3 the capabilities of ANU graduates for international employment;
   5.1.4 the extent and quality of ANU research collaboration internationally; and
   5.1.5 the quality of service to the international community.

5.2 The ANU Quality Review Committee will assess the ANU’s policy documentation, including international agreements and memoranda of understanding, and have regard to the findings of surveys and focus groups of students and staff, and the satisfaction levels of graduates.
Other Matters

A. In reviewing the performance of the Institute of Advanced Studies, the ANU Quality Review Committee will report specifically on:
   i. the capacity of the Institute to sustain excellent long-term, basic research; and
   ii. the appropriate future level of block funding for the Institute.

B. In evaluating the overall quality of ANU outcomes, the Committee will comment on general policy principles, organisational arrangements and administrative procedures for providing robust support to the ANU’s relentless pursuit of excellence.
EXECUTIVE SUMMARY

This report brings together the available evidence demonstrating the quality of the ANU’s performance across the functions of research, education and community service.

In general, the ANU is a unique Australian institution, undertaking research at international levels of distinction and offering a distinctive educational experience for undergraduate and graduate students. The ANU makes a significant contribution to the advancement of knowledge nationally and internationally.

Among Australia’s universities, the ANU is the leading institution on the following measures:
- Expenditure on research and experimental development per academic staff (FTE)
- Members of the Royal Society, Fellows of the British Academy and Fellows of Australian Academies
- Federation Fellowships and ARC Fellowships
- New ARC Discovery Grants
- The proportion of academic staff holding higher degrees
- The proportion of the total student body undertaking a higher degree by research.

The Quality of Research

External assessments confirm that the ANU is truly a world class-research university:
- Some 285 internationally eminent researchers, having considered more than 7500 works submitted for assessment by 1500 ANU researchers, have rated 68% of that work as being within the top 25% of world research and 29% as being in the top 5% of the world’s best research.
- The Institute of Advanced Studies was rated as having 74% and 36% of assessed works in the top 25% and 5% of world research respectively. This rating for the Institute broadly equates with that for Imperial College of Science and Technology as assessed through the British Research Assessment Exercise (RAE) in 2001.
- The Faculties were rated overall as having 62% and 21% in the top 25% and 5%. The Universities Centres as a group were rated as having 60% and 24% in the top 25% and 5%. These ratings are broadly comparable to those obtained for Oxford University through the British RAE.
- 123 of the assessors (44%) rated the ANU as being in the top 25 universities in the world in their field of research; 91 assessors (33%) rated the ANU in the top 50 universities in the world - that is 77% of assessors confirmed the world standing the ANU (as indicated by the Shanghai Jiao Tong analysis of 2003).
- In a number of fields of research the ANU was identified as having researchers and research groups at the forefront of the world’s best research.
- Fields of research where 40% or more of the assessed research was rated as being in the top 5% in the world include: astronomy & astrophysics; physical sciences; neurosciences; biochemistry and molecular genetics; information sciences and engineering; international relations, strategic and defence studies; demography; linguistics; and philosophy (62%).
- Fields of research where 75% or more of the assessed research was rated as being in the top 25% in the world include: astronomy & astrophysics; mathematical sciences; physical sciences; neurosciences; biochemistry and molecular genetics; clinical medicine and medical physiology; international relations, strategic and defence studies; history; philosophy; linguistics; and arts history and criticism (89%).

Executive Summary
By and large, the available bibliometric data reinforce the peer assessments by field of research. Of particular note is the recent sharp upward trend from 1991-95 to 1998-2002 in the ANU’s citation impact across all fields of research covered by ISI, with the exceptions of Mathematics, Chemical Sciences, and Environmental Sciences.

There are major discrepancies in Immunology, where the bibliometrics show high and increasing citations impact, assessors’ qualitative comments are positive but, with a small number of assessors, the numerical ratings are below expectation. These anomalies will be referred to the Research Quality Moderation Panel.

In the fields of Economics, Australian History and Foreign Languages, there is an unusually wide spread of assessor ratings and comments. These matters will be drawn to the attention of the Moderation panel.

In the field of Music Composition and Performance, assessors suggest special criteria to be applied. These suggestions will be further developed with a view to undertaking a separate assessment of musical output at a later stage.

The qualitative comments of assessors were generally very positive, highlighting areas of excellence and identifying the emerging talent of young researchers. Assessors’ comments also raise a number of matters worthy of further discussion within the University:

- There is a higher than expected volume of research published in local journals and book chapters.
- There is a lower than expected volume of output in some areas (this reflected the way researcher outputs were assigned to sub-disciplines).
- Problem-solving research for national policy purposes does not always break ground conceptually nor methodologically.
- In some fields, while the research is performed at high quality, the orientation is not necessarily in the currents of new thinking.
- There are indications of strong interactions across some areas, such as Legal Research, Neurosciences and Physical Sciences, but not in others.
The Quality of Research Training

The ANU is committed to maximising its contribution to high quality research student education under the Australian Research Training Scheme (RTS) and for international students (HDR student numbers at ANU have increased from 1305 to 1697 since 2000).

The contribution of the Institute of Advanced Studies to research training has grown significantly since the 1995 Review, from the some 200 higher degree research students (FTE) in 1992 and representing 25% of all ANU research student load, to 624 in 2003 and representing 43% of ANU higher degree research student load. Numbers grew further in 2004, with the Institute accounting for 47% of ANU higher degree student enrolments. The increase in the ratio of research students to academic staff in the research schools of the IAS, from the numbers noted by the Boardman Committee, is shown in the following table.

Table 1. Higher Degree Research Students per Academic Researcher

<table>
<thead>
<tr>
<th>Research School</th>
<th>1990-92</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research School of Biological Sciences</td>
<td>0.59</td>
<td>0.72</td>
</tr>
<tr>
<td>Centre for Resource and Environmental Studies</td>
<td>1.14</td>
<td>2.77</td>
</tr>
<tr>
<td>Research School of Chemistry</td>
<td>0.65</td>
<td>1.16</td>
</tr>
<tr>
<td>Mathematical Sciences Institute</td>
<td>0.33</td>
<td>0.54</td>
</tr>
<tr>
<td>Research School of Astronomy and Astrophysics</td>
<td>0.69</td>
<td>1.21</td>
</tr>
<tr>
<td>Research School of Social Sciences</td>
<td>0.79</td>
<td>1.01</td>
</tr>
<tr>
<td>Research School of Earth Sciences</td>
<td>0.47</td>
<td>0.69</td>
</tr>
<tr>
<td>Research School of Information Sciences and Engineering</td>
<td>1.15</td>
<td>2.09</td>
</tr>
<tr>
<td>Research School of Pacific and Asian Studies</td>
<td>1.18</td>
<td>1.45</td>
</tr>
<tr>
<td>Research School of Physical Sciences and Engineering</td>
<td>0.70</td>
<td>0.72</td>
</tr>
<tr>
<td>John Curtin School of Medical Research</td>
<td></td>
<td>0.82</td>
</tr>
</tbody>
</table>

- The ANU's individual Research Schools, Faculties, and University Centres provide quality research education for research students, with supervisory panels of at least three staff for each doctoral student to ensure access to research expertise University-wide and in related national institutions and research organisations in Canberra.
- The ANU provides unique, University-wide complementary programs for research students through the Graduate School, the Academic Skills and Learning Centre, the Division of Information and other central areas (e.g. the Statistical Consulting Unit, the Graduate Teaching Program, the Graduate Information Literacy Program, the Academic and Professional Skills Program).
The ANU's PhD cohort study (2001) found that over 80% of ANU doctoral students successfully completed the degree, the highest PhD completion rate reported by Deans and Directors of Graduate Schools in Australia.

The ANU's doctoral students recognise the high quality of the research experience at ANU (2004 PhD Focus Groups, 2004 Alumni survey, ANUDEQ 2000-2003), with the highest ratings among the Go8 research-intensive Universities for intellectual climate, infrastructure, and thesis examination (PREQ 1999-2003).

The ANU is committed to improving staff development for research degree supervisors with an expanded program of research supervision workshops for experienced supervisors; and to improving completion times for research students through more rigorous planning and feedback.

The Quality of Education

Education at the ANU is distinctive in its basis in the research culture of the University. The ANU offers a range of undergraduate and postgraduate programs, distinctive in that they are based on the areas of research excellence.

- In 2002, the ANU conducted a major review of Undergraduate Education. This has been used as the basis of the quality assessment for the purposes of the current review.
- The 2002 review identified a number of strengths of education at the University. It also identified a number of ways in which its educational provision could be improved. These ranged from entry profile and admissions targets; through the structures that underpinned single- and multi-disciplinary degree programs; assessment and academic standards; the research-led educational culture of the university; the management and administration of courses and programs; through to educational collaborations both internal and external, with national and international partners.
- The review has been revisited for this exercise, and the University's progress in implementing the recommendations and hitting the targets set two years ago has been evaluated.
- To complement internal data, national surveys, and national benchmarks, a number of external exercises were commissioned. These included focus-group surveys of student assessment of the quality of ANU educational provision, and surveys of domestic and international alumni.
- The ANU is proud to report a large number of indicators of the excellence of its degree programs, and widespread recognition among its students, staff, and the wider community of the academic quality and scholarly foundations of ANU education. The ANU is also pleased at the verifiable progress it has made in the implementation of the 2002 review.
- The ANU provides a wide range of postgraduate coursework education. The ANU will conduct a comprehensive review of this provision, of a scope comparable to the 2002 review of undergraduate education, in the second half of 2004.
CHAPTER 1: BACKGROUND

The 2004 review of the ANU arises partly in response to a decision of the Australian Government in 1995 to have conducted a “comprehensive review of the overall performance of the Institute of Advanced Studies in six years time.” That review was deferred, following a subsequent decision of the Government in 1999 to phase-in over three years the admission of the Institute into the competitive grants schemes of the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC).

The Council of the ANU considered the possible scope of a further review of the Institute in late 2003. Given the present relationship between the Institute’s research function with those of other staff in the University, and the distinctive character of ANU undergraduate and graduate education in a research-intensive environment, the Council decided to initiate a comprehensive, independent and external review of the quality of all the ANU’s performance.

On 2 March 2004, the Australian Government Minister for Education, Science and Training, Dr Nelson, agreed to the proposed review, in the following terms:

_I agree that it is in the best interests of the ANU, and indeed of all Australian universities, to undergo a comprehensive quality review to determine whether its goals and objectives are being achieved effectively, and to facilitate continuous improvement._

The 1995 Review of the Institute of Advanced Studies

In 1995, the Institute of Advanced Studies was subject to a comprehensive, external review. The review was jointly sponsored by the ANU and the ARC. An Institute Review Committee, chaired by Dr Keith Boardman, took account of evidence presented by the University, reports of peer review committees that examined each of the Schools and Centres of the Institute, bibliometric and contextual data, interviews with staff and students, submissions from interested parties, and meetings with members of government bodies and research organisations.

The ARC reported the outcomes of the Boardman review to the Government in December 1995 in the following terms:

_The Institute of Advanced Studies is a national asset which has a unique place in the Unified National System of universities in Australia. It has high calibre staff, excellent facilities and freedom from the responsibility of undergraduate teaching. Through the security provided by its block funding and its magnitude, the Institute has the capacity to undertake the type of long-term and large-scale research projects which are difficult to undertake when supported only by competitive research funding schemes. Block funding also provides the potential to undertake high-risk/high-cost research which is unlikely to yield an outcome in the short to medium term._

_The Australian Research Council finds that, overall, the Institute of Advanced Studies undertakes basic research of very high quality as judged by international standards and demonstrates intellectual leadership across many disciplines. The Institute also provides an excellent environment for research training at both the postgraduate and postdoctoral level. This finding is supported by the assessments of the eleven School and Centre peer review committees and the Institute Review Committee._
The ARC recommended that attention be given to improvement in four main areas:

- increasing the contribution of the Institute to research training;
- strengthening the ties between the Institute and the Faculties;
- extending the Institute’s research collaboration with other Australian universities; and
- developing its strategic planning processes, including its consultative processes with major Australian research agencies.

**The ANU in context**

The Australian National University was established with high expectations. It was to trigger a sea change in Australia's universities and, importantly, the establishment was an overt response from Government to a clear need to develop Australian knowledge and skills in Australia.

The Minister of the day commented that the University was *to advance the cause of learning and research in general, and take its rightful place among the great universities of the world. With the establishment of an Australian national university ...Australia will have taken one more step to aline (sic) itself with the great and enlightened nations of the world.*

The time ANU was established was a critical one for Australia and its place in the world: lurching from economic depression to war was no way for a country with serious aspirations for its future. And it was clear that dependence on others for essential knowledge in the sciences, humanities and social sciences was a sure path to poverty – economic as well as intellectual.

The ANU began as a research university – now it is a teaching and research university - with a continuing major presence in research that, in terms of concentration exceeds other Australian universities. It began with four research schools that were a direct reflection of contemporary directions in 1946: medical research, physical sciences, Asia-Pacific studies and social sciences; these Schools continue.

The Minister anticipated that the university would: *...bring still further credit to our country ...by collaboration and co-operation between its members and the research workers and teachers of the other Australian universities ...We have a duty to the world at large which we must recognise if we are to be accepted as a world power ...(the establishment of the ANU) is a measure which will bring very great benefits to our people and, at the same time, help us to assume our proper place in world affairs ...*

The move to invest in higher education was supported by the then Federal Opposition through its leader, and later Prime Minister, R.G. Menzies. He said (in 1945): *if a new university is to be created, it should be created on a first class scale with such financial foundation as will enable it to attract the highest talent ...The research aspect of University work needs to be brought to the very forefront of our educational thinking.*

Naturally, the ANU grew. It commenced teaching undergraduates (in 1960) and introduced new Schools, new Faculties, new fields and introduced new areas into existing disciplinary-based activity. Through it all the University has been mindful of the words of the founder: *The reputation of a university depends not on the number of its students or the splendour of its buildings, but on the quality of its members and the nature of its contribution to learning.*

---

1 J J Dedman, Hansard Vol 187,p1567
2 R G Menzies, Hansard Vol 184,p4614
Its members have achieved a great deal over the years.

Indeed, the previous review of the IAS reported that it was now a world player in which it has well established scholarly and research activity. With one overseas member of the Review Committee commenting that perhaps the country should spend less time tortured by egalitarian self doubts over the (IAS), recognize it for what it is - a unique national resource that would be almost impossible to duplicate elsewhere - and concentrate on considering how best it could be helped to meet the needs of the nation.

It is the people who make the ANU what it is. This review is an evaluation of their work and their efforts as staff and students as the University seeks to deliver on the still valid expectations of the founders and build from the strong base identified in the previous review.

The recent changes at the ANU reflect the environment in which the staff and students of the ANU operate. They are summarised below.
Recent Changes at ANU: 2000 – 2004

<table>
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<th>Program</th>
<th>Domestic/ International</th>
<th>2000</th>
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<th>2002</th>
<th>2003</th>
<th>2004 (a)</th>
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<td>864</td>
<td>873</td>
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<td></td>
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<td>273</td>
<td>279</td>
<td>312</td>
<td>375</td>
<td>431</td>
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<td>Higher Degree Research Total</td>
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<tr>
<td>Postgraduate Coursework</td>
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<td>Undergraduate</td>
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<td>Non-award</td>
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<tr>
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<td>International</td>
<td>59</td>
<td>93</td>
<td>94</td>
<td>103</td>
<td>122</td>
</tr>
<tr>
<td>Non-award Total</td>
<td></td>
<td>76</td>
<td>115</td>
<td>115</td>
<td>127</td>
<td>147</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>8205</td>
<td>8425</td>
<td>9216</td>
<td>10152</td>
<td>10698</td>
</tr>
</tbody>
</table>

Table 1: EFTSU by Program: 2000 to 2004

(a) 2004 data are as at 24 May 2004 and are likely to increase to full-year. They include 80 EFTSU of Medical School load.

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median score</td>
<td>89.60</td>
<td>89.05</td>
<td>86.74</td>
<td>88.85</td>
<td>90.40</td>
</tr>
</tbody>
</table>

Table 2: Median UAI Score, 2000 to 2004 (excluding UAIIs greater than 100 *)

*UAIs greater than 100 represent a forced offer rank (that is, a value artificially set high so that an offer is likely to be made).
Table 3: Undergraduate Operating Grant Load Against Government Targets, 2000 to 2004

(a) 2004 information is as at 24 May 2004 and are likely to increase to full-year. It includes 80 EFTSU of Medical School load.

The ANU was 4.9% under-enrolled against the 2000 DEST undergraduate operating grant target of 5,845 EFTSU. However, load increased substantially in 2002 and 2003 with the 2003 EFTSU 4.6% over-enrolled against the DEST target of 5,940 EFTSU.

Undergraduate operating grant load for full-year 2004 is likely to be at about the same level as 2003 full-year load and represent a similar over-enrolment against DEST targets (not counting the anticipated Medical School load of 80 EFTSU although this is included in these tables).
Revenue Growth

Since 2000, ANU’s revenue growth has been primarily from research grants and full-fee paying (graduate and international) students. Consultancy, contract research, and private revenue were also important, contributing 8.4% of income in 2003.

<table>
<thead>
<tr>
<th>Year ended Dec. 31</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating grant (including HECS &amp; PELS)</td>
<td>56.8</td>
<td>51.7</td>
<td>54.3</td>
<td>41.3</td>
</tr>
<tr>
<td>Research funding</td>
<td>9.5</td>
<td>10.0</td>
<td>14.0*</td>
<td>22.7**</td>
</tr>
<tr>
<td>Full fee-paying student income</td>
<td>4.2</td>
<td>4.8</td>
<td>6.0</td>
<td>6.8</td>
</tr>
<tr>
<td>State grants</td>
<td>0.2</td>
<td>0.2</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>Consultancy, contract research and private grants</td>
<td>6.9</td>
<td>7.1</td>
<td>8.3</td>
<td>8.4</td>
</tr>
<tr>
<td>Investment Income</td>
<td>12.4</td>
<td>10.3</td>
<td>5.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Other fees and charges</td>
<td>9.7</td>
<td>9.2</td>
<td>10.8</td>
<td>13.2</td>
</tr>
<tr>
<td>Other revenue</td>
<td>0.3</td>
<td>6.8</td>
<td>0.6</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Table 4 Revenue Base (% of total)

HECS—Higher Education Contribution Scheme. PELS—Postgraduate Education Loans Scheme. ARC—Australian Research Council. NH&MRC—National Health and Medical Research Council.

* The first entry of 25% of the IAS staff into ARC and NH&MRC: ** the second cohort.

The capacity of the ANU to deliver high quality research and education is dependent, to an important degree, on its administrative infrastructure and services. This Quality Review therefore includes an assessment of the degree to which the University’s administration is focused on supporting academic excellence.

The administration portfolio covers resource management, student administration, research support, and academic and information services. The administrative framework consists of central units responsible to the various members of the University Executive, and elements situated in all but the smallest academic areas answerable to the Deans or Directors of the areas.
In 2001, a detailed review of the University’s administration was undertaken by Professor Ken McKinnon and Ms Sue Walker. It focused on developing a culture of collaboration between academic and administrative arms of the institution, and the enabling of academic outputs by the administrative systems and processes. The McKinnon Report set out a path of reform that was broadly adopted by the University.

The assessment carried out for the Quality Review has involved an assessment by McKinnon and Walker of the progress made by the University in pursuit of the agenda established in 2001, and the present stance of the administration in support of academic activity. Self-assessments were compiled by each central administrative division and by each academic administrative unit. McKinnon and Walker considered the contributions and discussed them with stakeholders throughout the University.

The Executive Summary of their report, completed in June 2004, is printed below:

In the two and a half years since the 2001 Review of Administration there has been a sea change in the administration of the ANU. In particular the concept of an ‘enabling culture’ has been widely adopted by staff in the administrative divisions both central and among the Faculties, Centres and Research Schools and in large part in the academic community. Morale has turned for the better and there is a noticeable ‘can do’ attitude replacing the previous sense of inefficiency and drift.

While culture change can only be part complete in the time since the 2001 Review the commitment of staff is energising, and giving impetus and clear direction to the multitude of specific reform processes undertaken within the University. Developments have been influenced, and for the most part given extra impetus by the leadership of the Vice-Chancellor, Professor Ian Chubb, who has led the redevelopment of the University’s vision and near-term objectives, pointed the way to get the most benefit from government policy developments, gained the full cooperation of staff and led them through the changes proposed in the 2001 Review with vigour and imagination.

A more enabling culture is being realised through greater mutual respect, more positive attitudes, information sharing, cooperation, acceptance of the goal of continuous improvement, better processes and training and learning opportunities. Benchmarking of processes and practices against those in seven other universities has been introduced. New staff with a commitment to this culture have been recruited.

The framework of common University goals and infrastructure, common policies and devolved administrative operations advanced markedly in quality. Autonomous Research Schools, Centres and Faculties evaluated the changes as improving University administrative services. Coordination of central and devolved administrative units is still insufficient to resolve all of the problems of improvement of processes and the resolution of priorities for attention. The central administrative units showed the benefit of the wide array of initiatives undertaken since the Review. All are working with enthusiasm and application but different degrees of success so far. Quantitative benchmarking, in its early stage as yet, is giving further impetus to improvement.
Overall Approach to the Review of ANU Quality

The Review is designed to be an independent, comprehensive and transparent process. It focuses on the quality of outcomes, with reference to international and national benchmarks, and having regard to the purposes and goals of the ANU. The Review is being conducted by an independent, external committee of eminent persons, bringing breadth of perspective and depth of expertise and experience.

The Review Committee has been asked to scrutinise all available information about the performance of the ANU across all its functions and all its parts. This information includes self-assessments made by the ANU about its academic Faculties, Schools and Centres, and its service departments. The Committee has been asked to judge the extent to which the evidence available to it confirms or modifies the ANU’s self-assessments.

Information provided to the Committee has been drawn from publicly available and validated data sets, from external academic peer assessments, and from the results of surveys specifically undertaken for the Review by independent organisations.

The Committee’s Report on its findings will be made public. The response of the ANU Council to the Committee’s Report, including all its findings and recommendations, will be made public.
ANU
RESEARCH PERFORMANCE
INDICATORS OF EXCELLENCE

Compiled by: Statistical Services, Office of Quality Enhancement and Statistical Services, ANU

July 2004
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<table>
<thead>
<tr>
<th>Table</th>
<th>Performance Indicators - Research</th>
<th>Source</th>
<th>G8</th>
<th>AUS</th>
<th>O/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Expenditure on Research and Experimental Development</td>
<td>DEST</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Shanghai Jiao Tong University Ranking</td>
<td>Shanghai Jiao Tong University</td>
<td>Y</td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>Membership of Academies</td>
<td>Individual Society/Academies</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ARC Fellowships</td>
<td>ARC &amp; DEST</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>ARC Discovery Grants</td>
<td>ARC &amp; DEST</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>ARC Linkage - Projects</td>
<td>ARC &amp; DEST</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>NHMRC Project Grants</td>
<td>NHMRC &amp; DEST</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>NHMRC Program Grants</td>
<td>NHMRC &amp; DEST</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Academic Staff Holding Higher Degrees</td>
<td>DEST &amp; HESA*</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>10</td>
<td>Higher Degree Research EFTSU</td>
<td>DEST &amp; HESA*</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>11</td>
<td>Higher Degree Research Completions</td>
<td>DEST</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

*HESA  Higher Education Statistics Agency, UK
Table 1
Expenditure on Research and Experimental Development for 2000

<table>
<thead>
<tr>
<th></th>
<th>Total Expenditure</th>
<th>Research &amp; Experimental Development Expenditure</th>
<th>Go8 Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$'000</td>
<td>$'000</td>
<td>% of Total Expenditure</td>
</tr>
<tr>
<td>The Australian National University</td>
<td>407,808</td>
<td>284,391</td>
<td>69.7</td>
</tr>
<tr>
<td>All Other Group of Eight Universities</td>
<td>3,550,715</td>
<td>1,429,283</td>
<td>40.3</td>
</tr>
<tr>
<td>All Other Australian Universities</td>
<td>5,047,739</td>
<td>1,060,890</td>
<td>21.0</td>
</tr>
<tr>
<td>All Australian Universities</td>
<td>9,006,262</td>
<td>2,774,564</td>
<td>30.8</td>
</tr>
</tbody>
</table>

Comment:
The Research Expenditure data for 2000 are the latest data available. No data collection occurred in 2001 as the collection is based on a survey done every two years. The data for 2002 will not be available until later in 2004.

Sources:
Table 2
Shanghai Jiao Tong University Institute of Higher Education ranking for 2003

<table>
<thead>
<tr>
<th>Rank</th>
<th>Institution</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td><strong>The Australian National University</strong></td>
<td>Australia</td>
</tr>
<tr>
<td>92</td>
<td>The University of Melbourne</td>
<td>Australia</td>
</tr>
<tr>
<td>102-151</td>
<td>The University of Queensland</td>
<td>Australia</td>
</tr>
<tr>
<td>102-151</td>
<td>The University of Sydney</td>
<td>Australia</td>
</tr>
<tr>
<td>152-200</td>
<td>Monash University</td>
<td>Australia</td>
</tr>
<tr>
<td>152-200</td>
<td>The University of New South Wales</td>
<td>Australia</td>
</tr>
<tr>
<td>152-200</td>
<td>The University of Western Australia</td>
<td>Australia</td>
</tr>
<tr>
<td>201-250</td>
<td>The University of Adelaide</td>
<td>Australia</td>
</tr>
<tr>
<td>5</td>
<td>Harvard University</td>
<td>USA</td>
</tr>
<tr>
<td>19</td>
<td>University of Cambridge</td>
<td>UK</td>
</tr>
<tr>
<td>23</td>
<td>Tokyo University</td>
<td>Japan</td>
</tr>
<tr>
<td>43</td>
<td>University of Toronto</td>
<td>Canada</td>
</tr>
<tr>
<td>48</td>
<td>The University of Edinburgh</td>
<td>UK</td>
</tr>
<tr>
<td>55</td>
<td>University of Munich</td>
<td>Germany</td>
</tr>
<tr>
<td>55</td>
<td>New York University</td>
<td>USA</td>
</tr>
<tr>
<td>68</td>
<td>The University of Bristol</td>
<td>UK</td>
</tr>
<tr>
<td>79</td>
<td>Nagoya University</td>
<td>Japan</td>
</tr>
<tr>
<td>98</td>
<td>McGill University</td>
<td>Canada</td>
</tr>
<tr>
<td>98</td>
<td>Boston University</td>
<td>USA</td>
</tr>
</tbody>
</table>

Comment:
Group rankings are listed in alphabetical order.

Source:
Shanghai Jiao Tong University Institute of Higher Education Academic Ranking of World Universities - 2003
Table 3
Membership of Academies for 2002

<table>
<thead>
<tr>
<th>Membership of the Royal Society</th>
<th>Membership of the Australian Academies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons</td>
<td>% of Total Academic FTE</td>
</tr>
<tr>
<td>The Australian National University</td>
<td>35</td>
</tr>
<tr>
<td>Science, Health and Engineering*</td>
<td>N/A</td>
</tr>
<tr>
<td>Social Sciences and Arts*</td>
<td>N/A</td>
</tr>
<tr>
<td>All Other Group of Eight Universities</td>
<td>15</td>
</tr>
<tr>
<td>All Other Australian Universities</td>
<td>2</td>
</tr>
<tr>
<td>All Australian Universities</td>
<td>52</td>
</tr>
</tbody>
</table>

2002 Membership of the Royal Society - Group of 8 Ranking

Ranking of Group of 8 Universities

2002 Membership of Australian Academies - Group of 8 Ranking

Ranking of Group of 8 Universities

Comments:
1. Some double-counting due to dual affiliations. In addition, for some affiliations which were not entirely clear, best estimate was made, erring on the side of affiliation with a university if at all reasonable to do so.
2. The data for 2002 are the latest data available
3. (*) calculated on FTE within Division. Excludes FTE for areas not assigned in the Division structure.
4. (n/a) Data on Membership within Division is not available. However, it is understood that all Members are likely to belong to the Division of Science, Health and Engineering

Sources:
1. Royal Society Fellowship at August 2002 (http://www.royalsoc.ac.uk/royalsoc/index.html)

Chapter 1: Background
### Table 4
**ARC Fellowships for 2004**

<table>
<thead>
<tr>
<th></th>
<th>2002-2004 Federation Fellowships</th>
<th>2004 New ARC Fellowships in All Categories for APRF, ARF/QEII, APF**</th>
<th>All Categories ARC Fellowships</th>
<th>% of Total Academic FTE (2003)</th>
<th>Go8 Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Australian National University</strong></td>
<td>15</td>
<td>27</td>
<td>0.034</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Science, Health and Engineering</strong>*</td>
<td>11</td>
<td>25</td>
<td>0.054</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Sciences and Arts</strong>*</td>
<td>4</td>
<td>2</td>
<td>0.011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Other Group of Eight Universities</td>
<td>42</td>
<td>92</td>
<td>0.011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Other Australian Universities</td>
<td>17</td>
<td>47</td>
<td>0.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Australian Universities</td>
<td>74</td>
<td>166</td>
<td>0.008</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**
1. (*) Calculated on FTE within Division. Excludes FTE for areas not assigned in the Division structure.
2. (**) APRF - Australian Postdoctoral Research Fellowship, ARF - Australian Research Fellowship, QEII - Top 15 of the ARF, APF Australian Professorial Fellowship

**Sources:**
3. [http://unistats.anu.edu.au/Staff/Pivot_Tables/Staff_FullTime.xls](http://unistats.anu.edu.au/Staff/Pivot_Tables/Staff_FullTime.xls)
### Table 5

**ARC Discovery Grants for 2004**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number Go8 Rank $ Value of New Grants Go8 Rank</td>
<td>$'000 Go8 Rank</td>
</tr>
<tr>
<td>The Australian National University</td>
<td>115 0.092 1</td>
<td>34,698,338 27.9 1</td>
</tr>
<tr>
<td>Science, Health and Engineering*</td>
<td>85 0.128</td>
<td>28,293,303 42.5</td>
</tr>
<tr>
<td>Social Sciences and Arts*</td>
<td>30 0.053</td>
<td>6,405,035 11.4</td>
</tr>
<tr>
<td>All Other Group of Eight Universities</td>
<td>458 0.036</td>
<td>129,542,075 10.2</td>
</tr>
<tr>
<td>All Other Australian Universities</td>
<td>295 0.016</td>
<td>72,180,951 4.0</td>
</tr>
<tr>
<td>All Australian Universities</td>
<td>983 0.027</td>
<td>271,119,702 7.4</td>
</tr>
</tbody>
</table>

#### 2004 New ARC Discovery Grants - Group of 8 Ranking

![Graph showing the ranking of Group of 8 Universities based on 2004 New ARC Discovery Grants/Academic FTE](graph1.png)

#### 2004 New ARC Discovery Grants - Group of 8 Ranking

![Graph showing the ranking of Group of 8 Universities based on $'000 NewARC Discovery Grants/Academic FTE](graph2.png)

**Comments:**

1. $ Value of new grants is the total for all years of the grants commencing in 2004.
2. (*) Calculated on FTE within Division. Excludes FTE for areas not assigned in the Division structure.
3. (**) As Group of Eight universities have very few teaching-only staff this effectively expresses the FTE for academic researchers only. This is not the case with other Australian universities, which have larger teaching-only FTE.

**Sources:**

3. [http://unistats.anu.edu.au/Staff/Pivot_Tables/Staff_FullTime.xls](http://unistats.anu.edu.au/Staff/Pivot_Tables/Staff_FullTime.xls)
Table 6
ARC Linkage – Projects for 2004

| The Australian National University | 13 | 0.010 | 3 | 3,513,902 | 2,820 | 3 |
| Science, Health and Engineering* | 9 | 0.014 | 4 | 2,704,782 | 4,059 |
| Social Sciences and Arts* | 4 | 0.007 | 5 | 809,120 | 1,435 |
| All Other Group of Eight Universities | 107 | 0.008 | 6 | 26,783,671 | 2,103 |
| All Other Australian Universities | 111 | 0.006 | 7 | 20,317,398 | 1,134 |
| All Australian Universities | 244 | 0.007 | 8 | 54,128,873 | 1,586 |

2004 New ARC Linkage - Projects/Academic FTE

1. The data covers Linkage - Projects that involve project, Australian Postgraduate Awards Industry (APAI), and/or fellowship funding (L-P) and those that involve only APAI stipends (L-A).
2. $ Value of new grants is the total for all years of the grants commencing in 2004.
3. (*) Calculated on FTE within Division. Excludes FTE for areas not assigned in the Division structure.

Sources:
Table 7
National Health and Medical Research Council Project Grants for 2004

| The Australian National University  | 45 | 0.036 | 7 | 16,902,880 | 13,566 | 7 |
| Science, Health and Engineering* | 45 | 0.068 | | 16,902,880 | 25,369 | |
| All Other Group of Eight Universities | 784 | 0.062 | | 301,159,184 | 23,646 | |
| All Other Australian Universities | 162 | 0.009 | | 65,944,382 | 3,680 | |
| All Australian Universities | 991 | 0.031 | | 384,006,446 | 12,036 | |

2004 NHMRC Project Grants - Group of 8 Ranking

Ranking of Group of 8 Universities

$'000 NHMRC Project Grants/Academic FTE

ANU 8th

Ranking of Group of 8 Universities

Comments:
1. Includes all NHMRC Project Grants that received funding in 2004. $ Value of grants is the total funding for all years of the grants.
2. The data include NHMRC Project Grants funded through the Primary Health Care Research, Evaluation and Development Strategy funded by the Policy and Evaluation Branch, Department of Health and Ageing.
3. Funding from NHMRC for the ANU may be lower than would otherwise be the case as the data includes grants commencing before the IAS became fully eligible for NHMRC funding in 2003. The ANU entered partially into the scheme in 2002 and fully in the 2003 rounds.
4. NHMRC Project Grants are allocated to areas within the Division of Science, Health and Engineering.
5. (*) Calculated on FTE within Division. Excludes FTE for areas not assigned in the Division structure.
6. (**) Calculated on the Total Academic FTE for the University or group of universities. Not based on FTE within individual Schools or Divisions.

Sources:
Table 8
National Health and Medical Research Council Program Grants for 2004

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Australian National University Science, Health and Engineering</strong></td>
<td>5</td>
<td>0.004</td>
<td>4</td>
<td>17,942,944</td>
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<tr>
<td>All Other Group of Eight Universities</td>
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<td>0.004</td>
<td>4</td>
<td>244,787,326</td>
</tr>
<tr>
<td>All Other Australian Universities</td>
<td>2</td>
<td>0.000</td>
<td>2</td>
<td>8,425,580</td>
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<tr>
<td>All Australian Universities</td>
<td>54</td>
<td>0.002</td>
<td>4</td>
<td>271,155,850</td>
</tr>
</tbody>
</table>

2004 NHMRC Program Grants - Group of 8 Ranking

Ranking of Group of 8 Universities

Comments:
1. Includes all NHMRC Program Grants, Diabetes Collaborative Research Grants and International Collaborative Research Grants that received funding in 2004. $ Value of grants is the total funding for all years of the grants.
2. Funding from NHMRC for the ANU may be lower than would otherwise be the case as the data includes grants commencing before the IAS became fully eligible for NHMRC funding in 2003. The ANU entered partially into the scheme in 2002 and fully in the 2003 rounds.
3. NHMRC Program Grants are allocated to areas within the Division of Science, Health and Engineering.
4. (*) Calculated on FTE within Division. Excludes FTE for areas not assigned in the Division structure.
5. (**) Calculated on the Total Academic FTE for the University or group of universities. Not based on FTE within individual Schools or Divisions.

Sources:

Chapter 1: Background
Table 9
Academic Staff Holding Higher Degrees for 2003

<table>
<thead>
<tr>
<th></th>
<th>% of Total Academic Staff holding Doctorates</th>
<th>% of Total Academic Staff holding Masters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2003</td>
</tr>
<tr>
<td>The Australian National University</td>
<td>79</td>
<td>6</td>
</tr>
<tr>
<td>Science, Health and Engineering*</td>
<td>87</td>
<td>2</td>
</tr>
<tr>
<td>Social Sciences and Arts*</td>
<td>71</td>
<td>11</td>
</tr>
<tr>
<td>All Other Group of Eight Universities</td>
<td>55</td>
<td>15</td>
</tr>
<tr>
<td>All Other Australian Universities</td>
<td>47</td>
<td>24</td>
</tr>
<tr>
<td>All Australian Universities</td>
<td>51</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The University of Bristol</td>
<td>58</td>
<td>N/A</td>
</tr>
<tr>
<td>The University of Edinburgh</td>
<td>40</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Comments:
1. There are no breakdowns available to distinguish research from coursework for any of these postgraduate levels.
2. (*) Calculated on totals within Division. A small group of academic staff are not included as they hold positions outside the ANU Division structure.
3. Overseas data do not provide an equivalent breakdown for Masters qualifications as they are grouped in a category that includes ‘higher bachelors degrees’.

Sources:
3. HESA (UK Higher Education Statistics Agency), HESA Individualised Staff Return 2002/2003
# Table 10

## Higher Degree Research EFTSU as a % share of total EFTSU, 2002 & 2003

<table>
<thead>
<tr>
<th></th>
<th>2002 % of Total EFTSU</th>
<th>2002 Go8 Rank</th>
<th>2003 % of Total EFTSU</th>
<th>2003 Go8 Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Australian National University</td>
<td>12.8</td>
<td>1</td>
<td>13.3</td>
<td>1</td>
</tr>
<tr>
<td>Science, Health and Engineering*</td>
<td>22.3</td>
<td></td>
<td>23.9</td>
<td></td>
</tr>
<tr>
<td>Social Sciences and Arts*</td>
<td>8.9</td>
<td></td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>All Other Group of Eight Universities</td>
<td>7.6</td>
<td></td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>All Other Australian Universities</td>
<td>3.5</td>
<td></td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>All Australian Universities</td>
<td>4.9</td>
<td></td>
<td>4.9</td>
<td></td>
</tr>
</tbody>
</table>

## Overseas**

<table>
<thead>
<tr>
<th></th>
<th>2001/02</th>
<th>2002/2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>The University of Bristol</td>
<td>10.6</td>
<td>Not Available</td>
</tr>
<tr>
<td>The University of Edinburgh</td>
<td>9.5</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

## Comments:
1. (*) Calculated on EFTSU within Division.
2. (**) These institutions are selected on the basis that matching data are available. Data collections of US institutions do not cover this indicator.

## Definitions:
Student full-time equivalence (FTE) (UK): Represents the institution's best academic judgement of the full-time equivalence of the student during the HESA return period (academic/financial year 1 August - 31 July). A full-time student (i.e. one studying for a minimum of 24 weeks) studying for the entire duration of an academic year will be 100.0. Part-time students are returned as a proportion of an equivalent full-time course. Please note that FTE data will be based on the HESA standard session population. This includes all HE enrolments active at any point in during the academic year.

## Sources:
2. [http://unistats.anu.edu.au/Students/Pivot_Tables/Load.xls](http://unistats.anu.edu.au/Students/Pivot_Tables/Load.xls)
3. [http://www.hesa.ac.uk](http://www.hesa.ac.uk); Higher Education Statistics Agency, UK. (2002/2003 data has not been released.) Based on Student full-time equivalence (FTE).
Table 11
Higher Degree Research Completions as a Percentage of Total Award Completions, 2002

<table>
<thead>
<tr>
<th>Number of Higher Degree Research Completions</th>
<th>% of Total Completions</th>
<th>Go8 Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Australian National University</td>
<td>236</td>
<td>8.9</td>
</tr>
<tr>
<td>Science, Health and Engineering*</td>
<td>128</td>
<td>13.2</td>
</tr>
<tr>
<td>Social Sciences and Arts*</td>
<td>108</td>
<td>5.4</td>
</tr>
<tr>
<td>All Other Group of Eight Universities</td>
<td>2978</td>
<td>5.1</td>
</tr>
<tr>
<td>All Other Australian Universities</td>
<td>2627</td>
<td>1.9</td>
</tr>
<tr>
<td>All Australian Universities</td>
<td>5841</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Higher Degree Research Award Course Completions 2002 - Group of 8 Ranking

Ranking of Group of 8 Universities

Comments:
1. (*) Based on completions within Division. A number of cross-divisional completions have been counted in both Divisions (these are all at undergraduate level).

Sources:
CHAPTER 2: THE QUALITY OF RESEARCH

The quality in universities that counts – the quality of outcomes – is easier to assert than to measure. Thus the sector largely survives on impressions gained from assertions about performance. More formally, there is an audit of the processes that universities have developed that is carefully designed to reveal how well the machine is oiled and how it relates to the goals and aspirations of the university.

Few would argue that internal processes are not important. However, whether the well-oiled machine, or even a less well-oiled one, produces ball bearings that are spherical or square must eventually be the question to answer.

There is solid support for the ‘quality of outcomes is too hard to measure so let it not be attempted’ school, and there are people who would argue vigorously that it is somehow improper to do anything that might result in a revealing ‘league table.’ But surely we must soon ask how we as a sector can justify the use of public funds if what we do with them is, say, mediocre although well-oiled – and then spice the debate with the occasional rhetorical outburst and assertion of excellence?

The ANU has sought to identify the quality of the outcomes produced by the university – in research and education. We have also reviewed the administrative processes and infrastructure because they are the means by which we support the academic ends of the university.

As part of the research component of this review, there have been surveys, bibliometric analyses, independently conducted focus groups to give a current perspective to complement the historical information in surveys, relative performance measures using publicly available data and a large-scale internationally-focussed peer assessment of research outcomes.

Any one of these on its own might give a misleading impression of a university’s performance – although peer review, despite its well-known flaws, is a foundation stone on which much of what goes on in universities is built: from course development within the university to external research council judgements of which research to fund in our universities. It was also an important component of this review.

Overview of the Process (see Attachment A for more detail)

In February 2004, the ANU determined the parameters of the assessment of its research activity for the current Review. It was decided that the research assessment would focus on the quality of research outcomes, measured in three ways:

- Comparative indicators of national success in research, including contestable research funding, membership of learned academies, and the resources committed to support research (reported on in Chapter 1);
- A major international peer-review exercise of the quality of ANU’s research output in the twenty-one broad fields in which the ANU conducts research;
- Comparative bibliometric measures of research outcomes, including number of publications per staff member, number of publications in high-impact journals, and citation indices.

The process of the peer review exercise was derived from that of the UK Research Assessment Exercise. Specifically:

- All researchers at the ANU during the calendar year 2003 were eligible to participate in the exercise. The research of 1350 academic staff was assessed, representing over 90% of research and teaching staff.
• Each researcher submitted for assessment what they regarded to be their five best publications over the period 1996-2003. In all, some 6000 items were submitted.

• The full text (not just titles) of submitted items was made available to assessors through an on-line electronic database. This database contained most of the materials, but others were sent on CD or in hard copy by courier on request.

• Assessments would be made of the quality of these submitted items. However, contextual information such as overviews of ANU research in the discipline, descriptions of research school and faculties, and full publication lists of each researcher would be made available to assessors.

• Following the UK Research Assessment Exercise, assessors were asked to read a representative sample of the work they were sent, and then to make a broad judgement on all the work in their field, based on this sample as well as their prior knowledge of the work and the reputation of journals and publishers.

Assembling the Peers

There is no long list of willing peers waiting to be given work. The ANU therefore sought assessors who had to be: (i) eminent in the field; (ii) not recently connected to the ANU; (iii) not a Visiting Fellow of the ANU if they had work to be reviewed; (iv) not a recent co-author with staff of the ANU.

In March 2004, each School, Centre and Faculty nominated assessors in any of the thirty-two disciplines in which they were active, then met in their disciplines to ensure that:

• All specialist fields and research areas were sufficiently represented in the pool of assessors;

• Where at all possible, at least two assessors would be asked to assess the same work;3

• Assessors were prominent in their international community, and without strong historical links to the ANU.

As a result of these meetings and ongoing discussions, twenty-two fields were identified, some were renamed and reorganised better to reflect the organisation of research at the ANU.4

The disciplines were broken into sub-disciplines so that assessors could operate at a level closer to their specific interests and expertise.

Each assessor was asked to provide:

• Their assessment of the percentage of submitted items that was “world class” (in the top 25% of their field internationally);

• The percentage that was “exceptionally significant” (in the top 5% of their field internationally).

In addition, they were asked to give an estimate as to where the ANU falls in their field relative to all other universities (in the top 25 in the world, the top 50, the top 100, the top 200, or outside the top 200).

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2 In the case of early-career researchers (post-doctoral fellows and junior lecturers), up to five research items could be submitted.

3 In the case of law, where there were a great number of specialist fields, and in foreign languages, where there were small amounts of research in various languages, only one assessor was nominated for each specialism.

4 For example: Information sciences and engineering were combined to form a single field, as this reflects the organisation of the relevant faculty and school at the ANU; the biological and medical sciences were restructured to reflect the distribution and organisation of research in ecology, genetics, biochemistry, microbiology, neurosciences and clinical medicine across the JCSMR, the RSBS, and the Faculty of Science.
Assessors agreed that their names and affiliations could be printed in the final report.

**Retrospective Review of the Process**

**Peer Review**

The ANU assembled 320 assessors, 85% of whom were based overseas. It is noteworthy that:

- The return rate of assessments was 88.5%;
- Only three withdrew once the task (and its magnitude) was known to them;
- No assessor queried “world class” or the university’s other working definitions.

**Content analysis**

Assessors were asked for - and in almost all cases provided - a qualitative comment to support their numerical assessment.

Table 1 provides an analysis of the assessors’ qualitative comments. Each discrete qualitative judgment was assigned to one of four categories: exceptional, positive, mixed, negative.

- Exceptional comments were those in which ANU disciplines or academic units were, in the judgment of assessors, clearly distinguishable at the top of the field. Trigger words and phrases for inclusion in this category included "exceptional", "outstanding", "world leaders" [see below], "impressive international reputation", "absolute top", "extraordinary". The simple comment "world class", with no qualifiers, merely registered as a positive rather than exceptional comment.

- Other comments counted as positive included "high quality", "excellent", "significant".

- Mixed comments were significantly tempered positive or negative judgements.

- Negative comments were comments that were substantially critical.
Table 1: Assessor Qualitative Comments

<table>
<thead>
<tr>
<th>Discipline</th>
<th>% Except.</th>
<th>% Positive</th>
<th>% Mixed</th>
<th>% Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematical Sciences</td>
<td>38%</td>
<td>38%</td>
<td>19%</td>
<td>4%</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>54%</td>
<td>33%</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>Chemical Sciences</td>
<td>25%</td>
<td>57%</td>
<td>16%</td>
<td>2%</td>
</tr>
<tr>
<td>Astronomy and Astrophysics</td>
<td>31%</td>
<td>63%</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>Earth Sciences</td>
<td>62%</td>
<td>15%</td>
<td>15%</td>
<td>8%</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>43%</td>
<td>50%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>Biomedical sciences</td>
<td>33%</td>
<td>42%</td>
<td>18%</td>
<td>6%</td>
</tr>
<tr>
<td>Information Sciences and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>21%</td>
<td>47%</td>
<td>21%</td>
<td>11%</td>
</tr>
<tr>
<td>Environmental Research</td>
<td>9%</td>
<td>48%</td>
<td>33%</td>
<td>9%</td>
</tr>
<tr>
<td>Psychology and Mental Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>10%</td>
<td>80%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>Economics</td>
<td>15%</td>
<td>31%</td>
<td>27%</td>
<td>27%</td>
</tr>
<tr>
<td>Business and Commerce</td>
<td>0%</td>
<td>55%</td>
<td>45%</td>
<td>0%</td>
</tr>
<tr>
<td>Political Sciences</td>
<td>14%</td>
<td>54%</td>
<td>21%</td>
<td>11%</td>
</tr>
<tr>
<td>Studies in Human Society</td>
<td>32%</td>
<td>46%</td>
<td>15%</td>
<td>8%</td>
</tr>
<tr>
<td>History and Archaeology</td>
<td>41%</td>
<td>37%</td>
<td>20%</td>
<td>2%</td>
</tr>
<tr>
<td>Language and Culture</td>
<td>41%</td>
<td>54%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Philosophy</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Law</td>
<td>42%</td>
<td>46%</td>
<td>13%</td>
<td>0%</td>
</tr>
<tr>
<td>Visual Arts</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Indigenous Studies</td>
<td>35%</td>
<td>59%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Asian and Pacific Studies</td>
<td>30%</td>
<td>46%</td>
<td>13%</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>31%</strong></td>
<td><strong>48%</strong></td>
<td><strong>15%</strong></td>
<td><strong>6%</strong></td>
</tr>
</tbody>
</table>

The qualitative commentary of assessors were clearly positive, highlighting areas of excellence.

- Nearly one third of all assessor comments identified areas of research at the ANU as “outstanding”, “exceptional”, or displaying “world leadership”.
- Three quarters of comments were entirely positive. Many pointed out the emerging talent in certain areas, and instances of a strategic focus to the research effort of the university.

Moderation

The ANU brought together a group to help pave the way for the Review Committee by assisting the University in the presentation of its material. It was made clear to this group at the outset that they were not producing a report to be published nor involved in the overall judgement – that was the task of the Review Committee.

This was a useful part of the process in that the group identified a number of issues and asked questions that caused the ANU to present its material in different and less ambiguous ways. While this caused a delay in producing material for the Committee, it certainly helped pave the way.

- The group also identified that the ANU process shared some of the problems common to peer review. For example, in some sub-disciplines there were small numbers of assessors; some assessors commented that they had spent more than the suggested 5 hours and it was inferred that this might have influenced their response, or that they might not have read the material but drawn conclusions from

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5 An analysis of all the qualitative comments has been performed, with the results by discipline correlating with the numerical ratings given by assessors in a statistically significant way.
The journals within which work was published. There would be few peer review processes where such possibilities do not exist.

- The group thought that the assessors might have been doing different things: although assessing the percentage of submitted items that were “world class” (in the top 25% of their field internationally), and identifying the percentage that was “exceptionally significant” (in the top 5% of their field internationally) seems relatively unambiguous, it is not possible to determine what was in the minds of the assessors – so it remains a possible flaw. Similarly, responses to the question: (can the assessor) estimate where the ANU falls in their field relative to all other universities (in the top 25, the top 50, the top 100, the top 200, or outside the top 200) might have been based on different approaches – however, fewer than ten assessors suggested that they found this difficult.

- One comment related to the ANOP focus groups: it is important to remember that the surveys represent historical data and the focus groups more the views of a group of contemporary students – benefiting from changes introduced into the university in response to the surveys.

- The group also remarked that at the level of sub-disciplines - the finest level of disaggregation – there was greater uncertainty in the data. It was, as always, necessary to provide assessors with material close to their interests – most often at the level of sub-disciplines. The ANU aggregated assessments up to discipline level as a minimum, and not sub-disciplines.

This input led to a review of the comments assessors made about the process.
Assessors’ comments about the research assessment process

In addition to making their evaluations of the quality of research from each academic unit in their field of expertise, a number of assessors also offered comments about the process. These comments are summarised in Table 2.6

Table 2: Analysis of Assessor Comments

<table>
<thead>
<tr>
<th>Comment</th>
<th>Number</th>
<th>%7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small number of outputs submitted/assessed</strong></td>
<td>27</td>
<td>9.6%</td>
</tr>
<tr>
<td>Because assessors were asked to assign a rating to the research from each AOU contributing to a particular sub-discipline, sometimes one of these might only have been very small, say, in the case of an AOU’s output in a field subsidiary to its core teaching and research. Assessors sensibly cautioned against drawing general conclusions from such small samples. Of the 102 papers sent to the assessors in physical and analytical chemistry, three were from the ANU Supercomputer Facility. All three assessors commented on the difficulty of assessing such a small sample. Twenty seven (27) of the 285 assessors made such an observation: the quantum of work to which the comment applied amounted to around 80 papers, or 1.3% of the total ANU research submitted for assessment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Significant work not submitted</strong></td>
<td>15</td>
<td>5.3%</td>
</tr>
<tr>
<td>Assessors commented that the submitted work omitted significant publications from individuals that the assessors already knew, or that researchers were submitting fewer than five items. In almost all cases, this was because the &quot;missing&quot; work had been submitted to another group of assessors in another sub-discipline.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Access to full text of articles</strong></td>
<td>13</td>
<td>4.6%</td>
</tr>
<tr>
<td>Some assessors reported difficulty accessing the full texts of articles, either online or in their own institution’s library. The ANU undertook to provide texts on request, either electronically or in hard copy (see Guidelines to Assessors).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Work lay outside the main area of assessor’s expertise</strong></td>
<td>13</td>
<td>4.6%</td>
</tr>
<tr>
<td>The ANU research, and the nominated assessors, were assigned to one of 118 specialist sub-disciplines to allow as close a fit as possible between the work assessed and the research interests of the assessors. Nevertheless, some assessors reported that in some cases they were asked to pass judgement on work that fell outside their primary area of research.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Works listed twice</strong></td>
<td>6</td>
<td>2.1%</td>
</tr>
<tr>
<td>Multiply-authored papers could be submitted for assessment more than once, as each academic compiled his or her list of “five most significant” publications. Some assessors commented on this, and explicitly identified that they had not counted this work twice in calculating their percentage totals. In a small number of cases, researchers holding joint appointments, for instance between a Research School and a Faculty, had their work submitted twice, once for each AOU. Some assessors, unaware of the joint appointment, queried the appearance of the same researcher under two AOU’s.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Percentages as a measure</strong></td>
<td>5</td>
<td>1.7%</td>
</tr>
<tr>
<td>Issues related to the use of percentages as a measure of assessment. For instance, one explained that he had defined &quot;top 5%&quot; as being the top ten journals in his field worldwide. Two commented that using percentages would result in a “averaging” effect for larger AOU’s. One observed that he was not confident in the objective merit of the percentages, since I really do not know much about the vast number of weak papers published worldwide in my field.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Australia-specific nature of research</strong></td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>Assessors commented on the difficulties of international assessors making judgements about the significance of research that is particularly focussed on Australian issues, such as indigenous economic or Australian environmental policy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Previous careers of researchers</strong></td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Researchers including work for assessment that was completed prior to their joining the ANU.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6 This does not include correspondence with assessors in which comments offered informally about the process are impossible to separate from requests from assessors for guidance or clarification about the process.

7 This percentage is of the total number of assessors (285)
The overall quality of the ANU’s research performance

Table 3 details the results of the peer review process in an aggregated form. Assessment profiles by both discipline and ANU academic unit are provided later in this chapter.

- The 285 international peers researchers considered more than 6000 works submitted for assessment by 1350 ANU researchers. They have rated 68% of that work as being within the top 25% of world research and 29% as being in the top 5% of the world’s best research.
- The Institute of Advanced Studies was rated as having 73% and 35% of assessed works in the top 25% and 5% of world research respectively.
- The Faculties were rated overall as having 61% in the world’s top 25% and 21% in the top 5%. The Universities Centres as a group were rated as having 61% and 24% in the top 25% and top 5%.

These ratings place the ANU, its Institute, Centres and Faculties within the top few of the UK Russell Group of research-intensive universities as they were assessed through the UK Research Assessment Exercise (RAE) in 2001.

123 of the assessors (44%) rated the ANU as being in the top 25 universities in the world in their field of research; 91 assessors (33%) rated the ANU in the top 50 universities in the world - that is 77% of assessors identified the standing of the ANU as within the world’s top 50 universities (as indicated also by the Shanghai Jiao Tong analysis of 2003).

In a number of fields of research the ANU was identified as having researchers and research groups at the forefront of the world’s best research.
### Table 3a: International Peer Review Ratings for the ANU by 21 Disciplines (RFCD format) – results by discipline and academic group

<table>
<thead>
<tr>
<th>RFCDs</th>
<th>Discipline</th>
<th>ANU</th>
<th>Fac</th>
<th>IAS</th>
<th>Centres</th>
<th>ANU</th>
<th>Fac</th>
<th>IAS</th>
<th>Centres</th>
<th>Papers (*)</th>
<th>Staff (**)</th>
<th>Assessors (***)</th>
</tr>
</thead>
<tbody>
<tr>
<td>various</td>
<td>Asian and Pacific Studies</td>
<td>68.8</td>
<td>62.3</td>
<td>73.1</td>
<td>62.1</td>
<td>28.1</td>
<td>21.1</td>
<td>32.5</td>
<td>21.9</td>
<td>746</td>
<td>216</td>
<td>25</td>
</tr>
<tr>
<td>2401</td>
<td>Astronomy and Astrophysics</td>
<td>75.3</td>
<td>63.0</td>
<td>76.4</td>
<td>--</td>
<td>41.3</td>
<td>19.0</td>
<td>43.3</td>
<td>--</td>
<td>123</td>
<td>27</td>
<td>9</td>
</tr>
<tr>
<td>various</td>
<td>Australian Indigenous Studies</td>
<td>62.6</td>
<td>69.3</td>
<td>76.4</td>
<td>57.2</td>
<td>33.5</td>
<td>32.5</td>
<td>48.0</td>
<td>31.2</td>
<td>216</td>
<td>76</td>
<td>6</td>
</tr>
<tr>
<td>27</td>
<td>Biological Sciences</td>
<td>68.1</td>
<td>65.6</td>
<td>71.5</td>
<td>--</td>
<td>23.8</td>
<td>15.8</td>
<td>34.7</td>
<td>--</td>
<td>327</td>
<td>75</td>
<td>15</td>
</tr>
<tr>
<td>32 (not 321204, 321021)</td>
<td>Biomedical Research</td>
<td>60.7</td>
<td>49.7</td>
<td>68.6</td>
<td>47.9</td>
<td>27.8</td>
<td>30.6</td>
<td>32.7</td>
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<td>153</td>
<td>22</td>
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<td>35</td>
<td>Business and Commerce</td>
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<td>--</td>
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<td>18.3</td>
<td>20.1</td>
<td>--</td>
<td>7.9</td>
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<tr>
<td>25</td>
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<td>49.9</td>
<td>31.4</td>
<td>22.4</td>
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<td>--</td>
<td>19.1</td>
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<td>23.3</td>
<td>--</td>
<td>369</td>
<td>103</td>
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<tr>
<td>34</td>
<td>Economics</td>
<td>55.1</td>
<td>64.3</td>
<td>53.1</td>
<td>48.2</td>
<td>23.6</td>
<td>32.8</td>
<td>21.7</td>
<td>16.4</td>
<td>419</td>
<td>118</td>
<td>15</td>
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<tr>
<td>30</td>
<td>Environmental Research</td>
<td>48.4</td>
<td>45.9</td>
<td>51.3</td>
<td>48.8</td>
<td>14.0</td>
<td>10.1</td>
<td>17.6</td>
<td>20.1</td>
<td>205</td>
<td>62</td>
<td>11</td>
</tr>
<tr>
<td>43</td>
<td>History and Archaeology</td>
<td>75.3</td>
<td>71.4</td>
<td>78.2</td>
<td>75.6</td>
<td>33.2</td>
<td>21.4</td>
<td>39.3</td>
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<td>487</td>
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<tr>
<td>28 + 29</td>
<td>Information Sciences and Engineering</td>
<td>63.3</td>
<td>43.2</td>
<td>75.7</td>
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<td>32.6</td>
<td>16.1</td>
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<td>114</td>
<td>9</td>
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<tr>
<td>42</td>
<td>Language and Culture</td>
<td>75.2</td>
<td>70.8</td>
<td>87.2</td>
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<td>27.8</td>
<td>25.7</td>
<td>49.9</td>
<td>28.6</td>
<td>471</td>
<td>176</td>
<td>24</td>
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<tr>
<td>39</td>
<td>Law</td>
<td>62.6</td>
<td>61.4</td>
<td>64.1</td>
<td>70.0</td>
<td>20.9</td>
<td>17.0</td>
<td>25.8</td>
<td>55.0</td>
<td>437</td>
<td>173</td>
<td>12</td>
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<tr>
<td>23</td>
<td>Mathematical Sciences</td>
<td>83.8</td>
<td>74.5</td>
<td>89.3</td>
<td>72.8</td>
<td>37.5</td>
<td>31.1</td>
<td>42.6</td>
<td>18.5</td>
<td>250</td>
<td>62</td>
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<tr>
<td>44</td>
<td>Philosophy</td>
<td>89.2</td>
<td>80.0</td>
<td>94.0</td>
<td>--</td>
<td>62.1</td>
<td>20.0</td>
<td>84.0</td>
<td>--</td>
<td>129</td>
<td>34</td>
<td>2</td>
</tr>
<tr>
<td>24(not 2401)</td>
<td>Physical Sciences</td>
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<td>85.6</td>
<td>84.2</td>
<td>62.6</td>
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<td>41.0</td>
<td>43.0</td>
<td>26.7</td>
<td>560</td>
<td>133</td>
<td>17</td>
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<tr>
<td>36</td>
<td>Policy and Political Sciences</td>
<td>70.4</td>
<td>46.2</td>
<td>76.8</td>
<td>68.5</td>
<td>26.6</td>
<td>6.7</td>
<td>31.8</td>
<td>25.2</td>
<td>438</td>
<td>130</td>
<td>13</td>
</tr>
<tr>
<td>38 (not 3802), 321204, 321021)</td>
<td>Psychology and Mental Health</td>
<td>55.8</td>
<td>52.0</td>
<td>54.8</td>
<td>64.6</td>
<td>21.8</td>
<td>17.2</td>
<td>30.0</td>
<td>28.7</td>
<td>186</td>
<td>50</td>
<td>7</td>
</tr>
<tr>
<td>37</td>
<td>Studies in Human Society</td>
<td>63.1</td>
<td>57.7</td>
<td>68.4</td>
<td>55.2</td>
<td>32.6</td>
<td>26.1</td>
<td>39.5</td>
<td>22.3</td>
<td>600</td>
<td>184</td>
<td>18</td>
</tr>
<tr>
<td>41</td>
<td>Visual Arts</td>
<td>67.0</td>
<td>67.0</td>
<td>--</td>
<td>--</td>
<td>8.0</td>
<td>8.0</td>
<td>--</td>
<td>--</td>
<td>62</td>
<td>26</td>
<td>3</td>
</tr>
</tbody>
</table>

**ANU OVERALL RATINGS**

<table>
<thead>
<tr>
<th>Top 25%</th>
<th>Top 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANU</td>
<td>67.8</td>
</tr>
<tr>
<td>Fac</td>
<td>29.2</td>
</tr>
</tbody>
</table>

(*) Total number of papers available for assessment
(****) Some staff contributed work to more than one discipline
(****) These do not include a small number of assessors who reviewed units that were not part of the research or teaching and research units of the University.
Table 3b: International Peer Review Ratings for the ANU by 21 Disciplines – Assessors Rank the ANU among the Top Universities in their Fields.

<table>
<thead>
<tr>
<th>ANU Disciplines</th>
<th>ANU Ranked within Top 25 Universities worldwide</th>
<th>ANU Ranked within Top 50 Universities worldwide</th>
<th>ANU Ranked within Top 100 Universities worldwide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian and Pacific Studies</td>
<td>15</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Astronomy and Astrophysics</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Australian Indigenous Studies</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>11</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Biomedical Research</td>
<td>6</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Business and Commerce</td>
<td></td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Chemical Sciences</td>
<td>4</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Earth Sciences</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Environmental Research</td>
<td>3</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>History and Archaeology</td>
<td>9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Information Sciences and Engineering</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Language and Culture</td>
<td>10</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Law</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Mathematical Sciences</td>
<td>7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Philosophy</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>10</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Policy and Political Sciences</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Psychology and Mental Health</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Studies in Human Society</td>
<td>10</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Visual Arts</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>124</td>
<td>90</td>
<td>29</td>
</tr>
</tbody>
</table>

*Total number of papers available for assessment
(**) Some staff contributed work to more than one discipline
(***) These do not include a small number of assessors who reviewed units that were not part of the research or teaching and research units of the university
Bibliometric Analysis

A detailed bibliometric analysis of ANU research was prepared by the Research Evaluation and Policy Project (REPP) to inform the ANU Quality Review. This is an ideal setting in which to deploy bibliometrics as the analyses can be interpreted alongside other assessment procedures, such as peer review.

Table 4: Comparing ANU output per staff member (IAS and Faculties) with Australian averages.

<table>
<thead>
<tr>
<th>Total Output</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ANU academic staff numbers (as a % of Australia’s academic staff)</td>
<td>3.7%</td>
</tr>
<tr>
<td>ANU publications (as a % of Australian output).</td>
<td>7.7%</td>
</tr>
</tbody>
</table>

(ANU academic staff breakdown includes 44% in the Faculties and 56% in the IAS and Centres)

<table>
<thead>
<tr>
<th>Output: National average and ANU</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia’s publications per academic staff member (net of ANU)</td>
<td>3.0</td>
</tr>
<tr>
<td>ANU publications per academic staff member</td>
<td>6.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output: Using the average Australian output (net of ANU) to assume an output per staff member for the ANU Faculties:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANU Faculties would be</td>
</tr>
<tr>
<td>ANU (IAS + Centres)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output: using a Go8 average (net of ANU) to assume an output per staff member for the ANU Faculties:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANU Faculties would be</td>
</tr>
<tr>
<td>ANU (IAS + Centres)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output: using the average of the (next) best four to assume an output for the ANU Faculties:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANU Faculties would be</td>
</tr>
<tr>
<td>ANU (IAS + Centres)</td>
</tr>
</tbody>
</table>

Source: Certain data included in this section are derived from the Australian National Citation Report prepared by the Institute for Scientific Information®, Inc. (ISI®), Philadelphia, Pennsylvania, USA: © Copyright Institute for Scientific Information® 2002. All rights reserved. Staff numbers are drawn from Commonwealth Department of Education, Science and Training, Selected Higher Education Statistics, Staff, 2002.

By and large, the available bibliometric data reinforce the peer assessments by field of research. Of particular note is the recent sharp upward trend from 1991-95 to 1998-2002 in the ANU’s citation impact across all fields of research covered by ISI, with the exceptions of Mathematics, Chemical Sciences, and Environmental Sciences. Differing citation patterns or, habits in different disciplines, were accommodated by relating citation rates to the expected patterns in the journals where staff publish.

The ANU's citation per publication rate (cpp) is calculated and compared to the world average (relative impact). The same calculation is also done for the Go8 institutions and Australia in aggregate. In the field analyses, the ANU figure is disaggregated by area. This has not been done for total publications as citation practices are field specific, and it is not legitimate to compare directly areas of the university. In aggregate, the ANU's cpp rate is 34% above the world level.
The second measure shows citation rates over time, for four levels of aggregation. The ANU’s aggregate citation rate has been well above the world level across the full period covered by the REPP analysis. It has shown a particularly marked increase in the last decade.

Certain data included in this section are derived from the **Australian National Citation Report** prepared by the Institute for Scientific Information®, Inc. (ISI®), Philadelphia, Pennsylvania, USA: © Copyright Institute for Scientific Information® 2002. All rights reserved.

In addition Table 4 shows the output from the ANU compared with other Australian universities. Short of going back to each individual paper and identifying the location of each staff member, and trying to exclude research-only staff in other universities etc., we have taken the staff numbers supplied to the Commonwealth Department of Education, Science and Training in 2002, and assumed an output from the Faculties as if:

I. they were the same as the Australian average;
II. the Go8 average;
III. the average of the best four other universities.

The staff numbers for Centres are included because their output is included; and their data could not be extracted. Little of the block grant to ANU is used to support them. The figures are a reasonable approximation.
RESEARCH ASSESSMENT
BY
ACADEMIC UNIT
ACADEMIC UNIT PROFILE

RESEARCH SCHOOL OF ASTRONOMY AND ASTROPHYSICS (RSAA)

Major Disciplines: Astronomy and Astrophysics.

RESEARCH
RSAA is Australia’s leading astronomical institution and the name ‘Mt Stromlo’, the geographic location of the School, is internationally recognised as being associated with research of the highest quality. The School has a rich tradition in optical and infrared astronomy, which continues to this day. Nevertheless, studies at wavelengths spanning radio to X-ray are carried out at RSAA, and theoretical and computational astrophysics form an integral part of its comprehensive work.

Particularly worthy of mention are the School’s engagement and leadership in major surveys for astronomy and astrophysics:

- Using ultra-distant Type IA supernovae as standard candles, the High-z Supernovae Project, led by Brian Schmidt, provided the first evidence that the Universe is accelerating under the influence of a cosmic force that can be described by Einstein’s Cosmological Constant.

- The Two Degree Field Galaxy Redshift Survey (2dFGRS), a major program led by Colless of RSAA and Peacock of Royal Observatory Edinburgh, measured the positions and redshifts for 221,000 galaxies over five years of observations with the Anglo-Australian Telescope at Siding Spring. The 2dFGRS has resulted in precise new measurements of the total amount of matter in the universe, and the relative contributions of dark matter, ordinary baryonic matter, and neutrinos to the cosmic mass budget. The 2dF team also achieved an independent confirmation of the existence of dark energy, in the apparent form of a cosmological constant. The entire dataset is publicly available on CDs.

- The MACHO project, which involved significant US collaboration, carried out a massive survey for microlensing and variability in the Galaxy and the Magellanic Clouds using the robotic 50” telescope on Mt Stromlo. The MACHO team, which included current RSAA staff Freeman and Peterson, proved that most Galactic dark matter is not composed of compact, microlensing objects. The survey also provided a database for variable star research that is still being mined.

<table>
<thead>
<tr>
<th>Number of Academic Staff (FTE):</th>
<th>26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of General Staff:</td>
<td>53.7</td>
</tr>
<tr>
<td>Number of Students (EFTSU):</td>
<td>29</td>
</tr>
<tr>
<td>Higher Degree Research:</td>
<td>100%</td>
</tr>
<tr>
<td>Higher Degree Coursework:</td>
<td>0%</td>
</tr>
<tr>
<td>Undergraduate:</td>
<td>0%</td>
</tr>
</tbody>
</table>

| Number of pieces of work submitted for assessment: | 109 |
| Number of Assessors:                               | 9 |
| Number of staff with work submitted:               | 24 |

<table>
<thead>
<tr>
<th>External assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>% ANU in Top 25%</td>
</tr>
<tr>
<td>%ANU in Top 5%</td>
</tr>
<tr>
<td>76</td>
</tr>
<tr>
<td>44</td>
</tr>
</tbody>
</table>
In addition to that already mentioned, the RSAA staff has carried out research in smaller collaborations in the following areas:

- Ultra-low metallicity stars
- Stellar populations
- Emission properties of the ISM
- Gas content of the Universe
- Active Galaxies
- Galaxy populations
- Stellar variability
- Milky Way and galaxy dynamics
- Instrument Design
- Stellar atmospheres
- Dwarf Galaxies
- Quasars
- Gamma-Ray Bursts

For decades, RSAA has provided instrumentation for its own telescopes at Mt Stromlo and Siding Spring Observatories. Since 1999 it has also been providing instrumentation for the international Gemini consortium, first by winning the Near-infrared Integral Field Spectrograph (NIFS) contract for Gemini North, and subsequently the contract for the Gemini South Adaptive Optics Imager (GSAOI). The nearly completed NIFS was destroyed in the bushfires of January 2003, but it is being rebuilt as NIFS II with the aid of local industry. Its delivery is scheduled for early 2005 to Hawaii. GSAOI is on track for delivery before the end of 2005 to Chile, and it will become the premier near-infrared imaging instrument on 8m class telescopes.

With the aid of funding by Australia's Department of Education, Science, and Training, RSAA is carrying out an improvement of the systemic infrastructure at Siding Spring including: a new integral field spectrograph for the 2.3m telescope, high-speed data links between the Observatory and other Australian research centres, and a remote observing capability.

PRIZES, HONOURS AND AWARDS
The Institute of Scientific Information ranks international researchers based on the citation impact of their published work. In 2002, 6 of Australia's 33 Citation Laureates across all fields were astronomers from RSAA (Bessell, Colless, Dopita, Freeman, Mould & Peterson). In 2003, these numbers were 5 and 40, respectively. During the 1995-2003 period, three RSAA academic staff members (Dopita, Freeman & Mould) were elected members of the Australian Academy of Science; two (Colless & Schmidt) won the prestigious Vainu Bappu Award for contributions to Cosmology; one (Dopita) was awarded a Federation Fellowship from the Australian Research Council; another (Schmidt) won the inaugural Prime Minister's Malcolm Macintosh Prize for Research in the Physical Sciences by a young researcher; yet another (Freeman) became a fellow of the UK Royal Society and a winner of the US Heinemann Prize; and another (Sackett) was named an Associate of the UK Royal Astronomical Society.

RESEARCH COLLABORATION
RSAA plays important leadership roles in research and professional partnerships nationally and internationally. For example, several RSAA staff members assisted in compiling the 2001 mid-term review of Australian Astronomy's decadal plan. RSAA hosted, from 1998 through 2000, the initial Australian Gemini Project Office and provided its first Australian Gemini Scientist (Da Costa). The current Chair of the Australian Gemini Steering Committee (Da Costa), the convenor of ANITA, the Australian National Institute of Theoretical Astronomy (Bicknell) and the Vice President (President Elect) of the Astronomical Society of Australia (Da Costa) are all RSAA staff. Two RSAA academics (Dopita, Sackett) sit on the National Committee of Astronomy and one (Sackett) serves on the Board of Management for the Astronomy Major National Research Facility program. RSAA is leading Australia's interest in Extremely Large Telescopes, and has provided the Chair of the ELT Task Force (Colless) and two other members (McGregor and Sackett). RSAA staff members sit on the GSMT and OWL Science Working Groups (Colless and Sackett, respectively). An RSAA staff member (Briggs) serves on the Steering Committee for the Australian National Telescope Facility and another
(Schmidt) is a member of the Australian Square Kilometre Array Steering Committee. RSAA is also one of a handful of non-US member institutions in AURA (Association for University Research in Astronomy).

**BIBLIOMETRIC ANALYSIS**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>No of Pubs</th>
<th>Citations Per Publication</th>
<th>Impact relative to World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astronomy</td>
<td>494</td>
<td>16.06</td>
<td>2.39</td>
</tr>
</tbody>
</table>

**EDUCATION**

RSAA is internationally recognised for the quality of its PhD program. For example, of the 27 PhD graduates from RSAA in the period 1995-2003, over 80% remain employed in leading astronomical institutions across the world. Included in this group are two winners (Bureau and Putman) of prestigious Hubble Postdoctoral Fellowships. At the end of 2003, the Graduate Program at RSAA comprised 25 PhD students, of which 12 are male and 13 female. Nine of the students are international (Brazil, South Africa, Italy, United Kingdom, Germany (2), Canada, the Netherlands and New Zealand). In 2003, seven students entered the program and three students completed their PhD. As a result of recruitment in 2003, 10 new PhD students will begin at RSAA in 2004, the largest intake in over a decade.
RESEARCH SCHOOL OF BIOLOGICAL SCIENCES (RSBS)

**Major Disciplines:** Biological and Bio-medical Sciences; Plant Sciences; Genes, Ecology and Evolution.

**RESEARCH**

RSBS has become one of Australia’s major centres for research into the biology of plants and animals. Research ranges from the genomics of Australian marsupials to the fundamentals of photosynthesis, plant energetics, the interactions between plants and the global environment, plants and their ecosystems, vision in vertebrates and invertebrates, with applications in diagnosis and robotics, the cell biology and stability of the brain and retina, the behaviour of invertebrates and biorobotics. A robust track record of publications in the top journals of many fields is complemented by a program of biotechnology, with many patents and the commercialisation of products.

The school is comprised of ten research groups, working in the following areas of biological science:

- **The Central Nervous System Stability and Degeneration Group** works on developmental and cell biology of the mammalian central nervous system with emphasis on degenerative diseases.
- **The Comparative Genomics Group** is a major contributor to the study of the mammalian (including human) genome. Its special emphasis on Australian mammals gives it a unique international profile.
- **The Ecosystem Dynamics Group** aims to improve understanding of theory and process in ecological systems and to apply this knowledge to important biological questions such as the maintenance of biodiversity and the effects of global climate and atmospheric change on vegetation. Global Change Biology is a prominent theme of the research.
- **The Environmental Biology Group** studies fundamental aspects of plant growth and the adaptive responses of plants to environmental stresses, including global climate change, combining molecular-genetic approaches, developmental and biophysical studies and mathematical modelling.
- **The Genomic Interactions Group** focuses on legumes, plants of primary importance for the fixation of nitrogen from the atmosphere into the food chain, and into the production of a wide range of commercially or medially valuable products. The Group’s work is unique because of its pioneering use of proteomics to identify the proteins and peptides expressed during these key events.
- **The Molecular Genetics and Evolution Group** is a leader in the application of molecular genetics to studies of cell function and evolution. Their research programs include the molecular genetics of cytoskeletal regulation during development, the

**Number of Academic Staff (FTE): 95**

**Number of General Staff: 103.1**

**Number of Students (EFTSU): 59**

**Higher Degree Research: 100%**

**Higher Degree Coursework: 0%**

**Undergraduate: 0%**

**Number of pieces of work submitted for assessment: 236**

**Number of Assessors: 26**

**Number of staff with work submitted:**

*This includes fractional and adjunct appointments. RSBS has a large number of junior academics and their work was not routinely included.*

**External assessment**

<table>
<thead>
<tr>
<th>% ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>35</td>
</tr>
</tbody>
</table>
evolution of development mechanisms and the molecular genetics of neural development and function.

- The **Molecular Plant Physiology Group** studies plant and algal photosynthesis, growth and adaptation. Their studies contribute to understanding fundamental aspects of plant function, from the atomic and molecular to the whole-plant levels of organisation.

- The **Photobioenergetics Group** also studies photosynthesis, with a distinctive emphasis on the biophysics and chemistry of the light reactions involved. Their particular interest is in the first part of the photosynthetic process – the capture and conversion of light energy by photosystem II that leads to the oxidation of water.

- The **Plant Cell Biology Group** studies plant growth and development, and the interaction of plants with their pathogens, at the cellular and molecular level. Their work combines molecular and genomic analysis with the use of advanced methods of light and electron microscopy to localise gene products using antibodies and GFP technologies.

- The **Visual Sciences Group** works on the visual physiology and the visual behaviour of species ranging from humans to insects and arthropods. Their work includes the molecular analysis of the development of sense organs, the analysis of human brain function and the analysis of visual behaviour of insects and arthropods in their real visual worlds.

**Prizes, Honours and Awards**

- Centenary Medals for service to Australian science were awarded to 12 members of the School (2003).
- Dr. Spenser Whitney received the 2002 Goldacre Award from the Australian Society of Plant Scientists. (2003).
- Professor Jan Anderson was recognised as an ISI Highly Cited Researcher in Plant and Animal Sciences (2002).
- Dr. Ted Maddess received the Clunies Ross National Science and Technology Award (2002).
- Professor Mandyam Srinivasan was awarded an Inaugural Federation Fellowship, 2002-2006. and Honorary Doctorate (Doctor Honoris Causa), University of Zurich, Switzerland.
- Professor Graham Farquhar was recognised as the leading Australian Citation Laureate (2002).
- Professor Graham Farquhar with Dr R Richards, Dr A Condon, and Dr G Rebetzke, received the CSIRO Medal (for food-crop water-use efficiency) (2002).
- Professor Mandyam. Srinivasan MV, Dr. Shao-wu Zhang and Dr. Javaan Chahl were awarded the Australasian Science Prize (2002).
- Professor Barry Rolfe was elected President of the Electrophoresis and Proteomics Society of Australia (2002) and of the International Society for Plant Micro-Interactions (1999).
- Dr. Ted Maddess received the Australian Technology Award (University Sector) for development of a new and commercialised diagnostic technology for the eye disease glaucoma (1999).
FELLOWSHIPS
Staff of RSBS, including Visiting Fellows and Adjunct Professors, have been elected to Fellowship of the Australian Academy of Science and/or the Royal Society of London.

- Jan Anderson, FAA FRS
- Graham Farquhar, FAA FRS
- Brian Gunning FAA FRS
- Ralph Slatyer, FAA FRS
- Jonathan Stone, FAA.
- Richard Williamson, FAA
- John Andrews, FAA
- Jennifer Graves, FAA
- Adrian Horridge, FAA FRS
- Mandyam Srinivasan, FAA FRS
- Hugh Tyndale-Biscoe, FAA

Plant Sciences is a strong discipline at the Research School of Biological Sciences. The academic staff comprises:

- Five Fellows of the Australian Academy of Science,
- One Fellow of the Australian Academy of Technical Sciences and Engineering, and
- Two Fellows of the Royal Society.

There are 5 “Highly cited researchers” from RSBS in the Thomson-ISI Plant and Animal Sciences category, from a world-wide list of 254, of whom another 9 Australians are from outside the ANU. Some of the spread of work is shown in individual papers hyper-linked to the groups above (one paper, with brief commentary, per person). The RSBS Plant Scientists collaborate closely with plant scientists from The Faculties, in Biochemistry and Molecular Biology and Botany and Zoology.

BIBLIOMETRIC ANALYSIS

<table>
<thead>
<tr>
<th>Discipline</th>
<th>No of Pubs</th>
<th>Citations Per Publication</th>
<th>Impact relative to World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Sciences</td>
<td>233</td>
<td>8.42</td>
<td>2.11</td>
</tr>
<tr>
<td>Biochemistry and Molecular Genetics</td>
<td>161</td>
<td>8.40</td>
<td>0.97</td>
</tr>
</tbody>
</table>

EDUCATION
RSBS provides research training at graduate and postdoctoral levels. The graduate student program provides more than just a traditional research project; students are also given opportunities to gain various skills in all aspects of personal and career development. RSBS also participates in specialist undergraduate teaching across the ANU campus and in other universities.

RSBS has been successful in building its training of postgraduate students, doubling its RTS (Research Training Scheme for domestic students) enrolments over the past five years, from 25 to 50.

COMMENTARY
RSBS has established two major research groups in animal genetics in the last few years (2002-003), which have greatly increased productivity in this field. Both groups lead an arc centre of excellence and are of high quality. This increase would not be apparent in the bibliometric data studied in the present review.

Plant Sciences is a major subdiscipline, included in the major research output document within the discipline of Biological Sciences. Plant Sciences has been a major focus of the Research School of Biological Sciences, from its foundation, and its research achievements have been highly distinguished, highly cited and internationally recognised. If the Review Committee chose it would be valuable to them (and important for the School) to identify the research performance of the Plant Science Groups. This was succinctly summarised at a preliminary stage of the Review as part of the context statements.
ACADEMIC UNIT PROFILE

RESEARCH SCHOOL OF CHEMISTRY (RSC)

Major Disciplines: Chemical Sciences

RESEARCH
The Research School of Chemistry was established in 1967 as part of the Institute of Advanced Studies at the ANU. The School’s mission is to conduct research and research training in the broad field of chemistry, to the top international standards. Although many of our staff are engaged in some undergraduate teaching, the School’s mission does not include undergraduate teaching.

The School’s research is led by some 22 independent research group leaders. Although the School is non-departmental the School’s research is loosely grouped into five areas: biological chemistry, inorganic chemistry, organic chemistry, physical chemistry and theoretical chemistry.

Research carried out at the RSC has achieved high international and national recognition. This is evidenced by the fact that since its founding the School has had 7 Fellows of the Royal Society of London (in the field of chemistry the rest of Australia has only ever had one), and 15 Fellows of the Australian Academy of Science. The H.G. Smith Memorial Medal is the highest research award for the Royal Australian Chemical Institute. RSC staff members have won this award 11 times. RSC staff fill more than 60 positions on Editorial Boards for professional chemistry journals.

2004 was the second year in which all RSC researchers were eligible to receive Australian Research Council grants. In return for being eligible to receive such grants, the RSC recurrent budget was decreased by approximately $1 million per annum. After only two years of full access to the ARC grant system, of the 19 continuing (i.e. tenured) research staff only 2 do not presently hold an ARC or NH&MRC research grant. The national success rate for ARC grants is ~20%. In 2004 total funding to be received from ARC (for calendar 2004 only) but excluding LIEF grants (inter-university major equipment grants) was over $3m. This figure is an underestimate because it excludes a number of collaborative grants with external Universities where RSC was not the lead institution.

BIBLIOMETRIC ANALYSIS

<table>
<thead>
<tr>
<th>Discipline</th>
<th>No of Pubs</th>
<th>Citations Per Publication</th>
<th>Impact relative to World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Sciences</td>
<td>500</td>
<td>4.45</td>
<td>1.21</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>147</td>
<td>5.46</td>
<td>1.45</td>
</tr>
</tbody>
</table>
Some Comments Regarding Citations (from RSC)

Although the Review Committee will be provided with very detailed citation statistics a few key observations are given here. According to ISI data updated on March 1, 2004 to cover an eleven year period: January 1, 1993 – December 31, 2003

- Chemistry accounted for more ANU citations than any other ISI subject category.
- Chemistry produced the second largest number of ANU publications. Physics produced the most and Geosciences the third largest number of publications.
- ANU was ranked 95th in the world by chemistry citation numbers. This ranking includes government and industrial research laboratories as well as universities. To put this into perspective, the University of Chicago was ranked slightly ahead of ANU at 87 while the universities of Maryland and Johns Hopkins as well as the Weizmann Institute were ranked lower than ANU.
- Australian chemistry citation rankings were: ANU 95, Sydney 167, University of Melbourne 204 and University of New South Wales 212.

Chemistry at MIT is ranked 5th in the world by numbers of citations. ANU is ranked 95, MIT 5, Cambridge 6 and Oxford 26. However, if we normalise the number of chemistry publications and the number of citations by the number of chemistry research staff and students at the various universities we observe the following:

<table>
<thead>
<tr>
<th>University</th>
<th>Staff &amp; Students</th>
<th>Publications</th>
<th>Citations</th>
<th>Pubs/ss</th>
<th>Cites/ss</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANU</td>
<td>137</td>
<td>1,876</td>
<td>21,810</td>
<td>13.7</td>
<td>159.2</td>
</tr>
<tr>
<td>MIT</td>
<td>373</td>
<td>3,340</td>
<td>68,988</td>
<td>8.9</td>
<td>184.9</td>
</tr>
<tr>
<td>Cambridge</td>
<td>500</td>
<td>4,849</td>
<td>63,597</td>
<td>9.7</td>
<td>127.2</td>
</tr>
<tr>
<td>Oxford</td>
<td>440</td>
<td>3,614</td>
<td>42,198</td>
<td>8.2</td>
<td>95.9</td>
</tr>
</tbody>
</table>

Notes:
1. “ss” means academic research staff and research students. At ANU this includes 107 staff and students from RSC and 30 from the Chemistry Department.
2. The numbers of research staff and students at MIT is an underestimate because some research groups list no staff or students on their “group” web pages.
3. These numbers are estimated to be accurate to no more than ±5%.

After normalising for the number of people doing chemistry research at each organisation, ANU chemistry publishes more research papers per academic staff and student than does MIT, Cambridge or Oxford. The ANU citation rate per academic staff and student, is slightly less than MIT (160 vs 185) but is still greater than either Cambridge or Oxford (127, 96 respectively). In this sense when we normalize the publication and citation rates of the universities by noting their size, ANU and MIT chemistry are comparable and both are slightly better performers than Oxford or Cambridge. A quick glance through the top 20 chemistry institutions in the world suggests that they are all much larger organisations than the RSC. Among Australian universities, ANU (137), Sydney (124), Melbourne (118) and UNSW (130) are each roughly similar in size so the citation rank order is little changed when we normalise by department size.

Education

There are research groups in the Research School of Chemistry within the Institute of Advanced Studies, and in the Department of Chemistry in the Faculty of Science, working in research areas from a wide spectrum of chemistry fields.

The majority of the affiliated supervisors are Leaders of Research Groups in the Research School of Chemistry.

Graduate students are offered research opportunities in the following branches of chemistry: biological chemistry; biological macromolecules, including enzyme function; NMR studies of macromolecules; protein crystallography; biological activity of heterocycles; bio-organic
synthesis; enzymology and kinetics of pteridines; natural products; organic synthesis; free radicals; mass spectrometry; theoretical organic chemistry; biomimetic and coordination chemistry; organometallics; inorganic stereochemistry; electrochemistry; crystallography; solid state chemistry; disordered materials; new materials and conducting polymers; interaction of radiation and matter; laser and optical spectroscopy; magnetic resonance and photophysics; dynamics and chemical physics; theoretical biomolecular dynamics; liquid state and statistical mechanics; liquid properties and ion diffusion; poly-electrolytes; physical and theoretical chemistry of polymers; statistical mechanics of macromolecules, solutions and interfaces; biomembranes and biophysics; and surface colloid chemistry.

**COMMENTARY**

A large number of international scientists visit the above groups each year, contributing to research projects, the extensive seminar series and graduate lecture courses. Collaboration with other Australian universities, government laboratories and industry also features in this program.

Laboratories are fully equipped to international standards with excellent facilities in computing and computer graphics, spectroscopy (optical, infrared, epr, nmr), mass spectrometry, electron microscopy and X ray crystallography.
ACADEMIC UNIT PROFILE
RESEARCH SCHOOL OF EARTH SCIENCES (RSES)

**Major Disciplines:** Earth Sciences; Chemical Sciences

**RESEARCH**
The Research School of Earth Sciences (RSES) is one of the top university-based geoscience programs and a research leader in the physics, chemistry, material properties and environmental conditions of the Earth. Its role is to conduct research at the highest international level and take leadership in defining new directions in geophysics and geochemistry, particularly those relevant to the geologic setting and needs of Australia. RSES has the country’s premier concentration of basic research facilities in experimental and observational geoscience including: the Australian National Seismic Imaging Resource (ANSIR), the Sensitive High Resolution Ion Micro-Probe (SHRIMP) facility, and the Quaternary Dating Research Centre which houses a complete set of facilities for dating the record of Earth systems over the past million years.

The work of the school is for administrative purposes grouped into two four areas: Earth Chemistry, Earth Physics, Earth Materials, Earth Environment.

**Earth Chemistry** utilises elemental and isotopic abundances to examine the processes affecting the Earth and solar system. Tracer investigations range in scale from that of the solar system to diffusion at the atomic scale yielding information as diverse as elemental fractionation during solar system formation, to the nature of Earth’s earliest crust and atmosphere, to the origin of ore deposits, to the evolution of the Himalayas.

**Earth Environment** specialises in revealing high-resolution environmental records preserved in fossil and modern corals, cave deposits, and layered sedimentary sequences to investigate global processes, such as climate and sea-level change, human evolution and migration, and landscape evolution. Research is underpinned by laboratory facilities that enable analysis of virtually any trace element or isotope system.

**Earth Physics** investigates the structure and dynamics of the Earth using a range of advanced physical and mathematical techniques. Present research focuses on the responses of the ocean and solid earth to different types of forcing and using circum-Australian earthquakes as probes for the structure in the Earth’s mantle. The research effort divides into geodynamics, seismology and geomagnetism, geophysical fluid dynamics, and computational geophysics, with extensive interactions within and between the different components.

**Earth Materials** focuses on the interrelated chemical and physical behaviour of rocks and minerals under geological conditions using state-of-the-art facilities for characterisation and mechanical testing with the goal of understanding the structure and composition of the Earth. Key issues are first identified through field-based observations and then addressed through laboratory study. Insights thus gained are then extended through suitable models to improve our understanding of Earth.
Prizes, Honours and Awards
During the period under review, major international awards to RSES faculty include the:
- 2004 Walter Bucher Medal, American Geophysical Union, Prof M. Paterson
- 2003 Schlumberger Medal, Mineralogical Society of London, to Prof H. O'Neill
- 2001 Prix International Georges Lemaître, Louvain Uni., to Prof K. Lambeck
- 2000 Murchison Medal, Geological Society of London, to Prof D. Green
- 1997 Alfred Wegener Medal, European Union of Geosciences, to Prof K. Lambeck
- 1996 Norman Bowen Award, American Geophysical Union, to Prof M. Harrison

Fellowships and Senior Appointments
- Four Fellows of the Royal Society of London (100% of Australian earth scientists)
- Ten Fellows of the Australian Academy of Sciences (45% of earth science FAA)
- Ten Fellows of the American Geophysical Union (80% of all Australian Fellows)
- Five Honorary Fellows, Geological Society of America (70% of all Australian GSA Honorary Fellows)
- One Foreign Member of the Russian Academy of Sciences

Bibliometric Analysis

<table>
<thead>
<tr>
<th>Discipline</th>
<th>No of Pubs</th>
<th>Citations Per Publication</th>
<th>Impact relative to World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth Sciences</td>
<td>578</td>
<td>5.63</td>
<td>1.69</td>
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Education
RSES graduates have been unusually successful, with >80% since 1971 remaining engaged in full-time geoscience research. Total research student enrolment 1995-2003:

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<tbody>
<tr>
<td>PhD (Dom./Int.)</td>
<td>45</td>
<td>49</td>
<td>53</td>
<td>50</td>
<td>50</td>
<td>45</td>
<td>40</td>
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<td>1/0</td>
<td>0/0</td>
<td>1/0</td>
<td>1/0</td>
</tr>
</tbody>
</table>

Total PhD completion rate: 98.7%; Percent completing within four years (PhD) or two years (M.Phil): 47%; Percent of domestic students holding Australian Postgraduate awards: 56%.

Commentary
Evidence of our international standing is found in bibliometric indicators, the peer assessment summarized as part of this review and the high level of external recognition of staff (Fellowships and Prizes and awards).

Due to time pressures, most of the assessors selected by the Geophysics area of the School (RSES) were unable to provide their assessment of the School's research performance. Consequently, several of our distinguished Geophysics staff members, including an FRS, several Fellows of the Australian Academy of Sciences and the American Geophysical Union who have made outstanding contributions in a broad range of fields of the Earth Sciences,

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Chapter 2: The Quality of Research
were not included in the assessors’ performance report. This also explains why, despite representing approximately 30% of the research activities in earth sciences at the ANU, geophysics was not directly identified in the quality and performance assessment.
ACADEMIC UNIT PROFILE

RESEARCH SCHOOL OF INFORMATION SCIENCES AND ENGINEERING (RSISE)

**Major Disciplines:** Systems Engineering, Telecommunication Engineering, Computer Sciences and Information Sciences.

**RESEARCH**

The Research School of Information Sciences and Engineering (RSISE) is the newest of the research schools of the Institute of Advanced Studies. It was formed in 1994 from the Systems Engineering Department and Computer Sciences Laboratory in the Research School of Physical Sciences and Engineering, and from the former Centre for Information Science Research.

RSISE is comprised of three departments:

The **Department of Systems Engineering** started 22 years ago as the first engineering department at ANU. Subsequently, the Department has built new teams in borderline Computer Science/Engineering areas such as learning systems, robotics and vision systems. The department covers a range of disciplines and research cultures and this feature itself is the achievement of what we see as a key performance indicator, as is the entrepreneurial role of spawning the Computer Sciences Laboratory, the Telecommunications Department and the Machine Learning Group. The Department played a key role in establishing the Department of Engineering in the Faculties and more recently the National ICT Centre Australia (NICTA), providing also the foundation for two of its twelve programs.

In the **Computer Sciences Laboratory**, both the Automated Reasoning Group (ARG) and the Machine Learning Group (MLG) are highly prominent internationally. The ARG has a continuous history going back to the 1970s. This group is easily the most prominent one in this area in Australia and is well-known internationally for its work especially in automated deduction and non-standard logics. The MLG has had a shorter history of about 8 years and has had a high turnover of staff but has nevertheless maintained a particularly high reputation for its work in computational learning theory and, more recently, has become one of the world-leading groups in kernel methods.

**Telecommunications Engineering** is the smallest of three departments in RSISE, currently with two continuing positions and one fixed term position. The department is primarily concerned with the physical and foundational aspects of physical layer communications, particularly those parts related to mobile and wireless communications. The strengths are in channel modelling, multi-user and multi-access technologies, orthogonal frequency division multiplexing (OFDM), ultra wideband (UWB), continuous space-time communications, and a number of other related sub-disciplines.

| Number of Academic Staff (FTE): | 26 |
| Number of General Staff: | 18.2 |
| Number of Students (EFTSU): | 52 |
| Higher Degree Research: | 100% |
| Higher Degree Coursework: | 0% |
| Undergraduate: | 0% |

| Number of pieces of work submitted for assessment: | 155 |
| Number of Assessors: | 7 |
| Number of staff with work submitted: | 35* |

*This number includes fractional and adjunct appointments and all grades of academic staff.

<table>
<thead>
<tr>
<th>External assessment</th>
<th>%ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>76</td>
<td>51</td>
</tr>
</tbody>
</table>
From August, 2004 the Departments of Systems and Telecommunications Engineering will be combined to form the Department of Information Engineering.

**Prizes, Honours and Awards**

Staff of the School are well represented in fellowships of learned academies.

- Three are Fellows of the IEEE (of a total of five across the University),
- Two are Fellows of the Australian Academy of Science, and
- Four are Fellows of the Australian Academy of Technological Sciences and Engineering.

Professor Anderson is also a Fellow of the Royal Society of London (a very unusual honour for an engineer) and was President of the Australian Academy of Science from 1998-2002. Anderson is also a Foreign Associate of the US National Academy of Engineering. He was a member of the Prime Minister’s Science, Engineering and Innovation Council from 1998-2002 and a member of the Australian Research Council or its Board from 2000-2003. Notwithstanding his being Chief Scientist of NICTA, he remains a staff member of RSISE. Professor Peter Bartlett, now at the University of California, Berkeley, was the recipient of the Prime Minister’s Malcolm MacIntosh award in 2001.

Professor Alex Zelinsky, formerly head of the robotics research program was appointed recently Director of the CSIRO Information and Communications Technology Research Centre; he was also founder and CEO of Seeing Machines.

Professor Bob Williamson from Telecommunications Engineering was appointed Canberra Laboratory Director of NICTA from January 2004.

Staff of RSISE occupy 26 positions as editor, associate editor or as member of editorial boards of journals.

**Education**

The School has long seen as part of its Mission the need to train the next generation of leaders in ICT. Growth in research student numbers has been excellent in the past five years, as seen in the following table of enrolments (not load). Almost all students over this period have been enrolled full time. For 2004, 21 students have NICTA scholarship support.

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
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<tr>
<td>PhD domestic</td>
<td>20</td>
<td>18</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>36</td>
</tr>
<tr>
<td>PhD international</td>
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<td>7</td>
<td>7</td>
<td>14</td>
<td>16</td>
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<td>PhD total</td>
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<td>52</td>
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<tr>
<td>Mphil domestic</td>
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<td>3</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Mphil international</td>
<td>0</td>
<td>0</td>
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<tr>
<td>TOTAL</td>
<td>32</td>
<td>28</td>
<td>37</td>
<td>48</td>
<td>52</td>
<td>57</td>
</tr>
</tbody>
</table>

**Commentary**

RSISE is very pleased with the strength of the assessors’ comments on its performance, and notes particularly the excellent international reputation ascribed to Systems Engineering under the leadership of Anderson and Moore for many years.

One assessor queries the “theoretical orientation” of RSISE and the fact that “data bases, data structures and algorithmic aspects” are not included in our research programs. The latter, in fact, form part of the research programs in the Faculty of Engineering and Information Technology, which is complementary to RSISE in many respects. We have taken a conscious decision to concentrate only on Automated Reasoning and Machine Learning in our Computer Systems Laboratory. In relation to theory versus applications it must be remembered that our CSL is fundamentally constructed as a theoretical department; having said that some applications work is about to commence. There is also a strong applications
component in Systems Engineering, concerned particularly with robotics and submersible vehicles. Further, almost all of the work carried out in Telecommunications Engineering has an applied objective.

The School has a strong theoretical orientation since it addresses those research questions that underpin the next generation of applications in the information sciences and engineering. Nevertheless, much of its work, especially in signal processing, machine learning, optimisation, vision systems and telecommunications has an explicit applied objective. Research in robotics, submersibles and other autonomous vehicles is more directly applications driven.
ACADEMIC UNIT PROFILE

JOHN CURTIN SCHOOL OF MEDICAL RESEARCH (JCSMR)

Major Disciplines: Biomedical Sciences, Genetics and Gene Regulation, Health Sciences

Other disciplines: Chemistry

RESEARCH
In 2003 JCSMR had a total academic staff of 98 of whom 18 were professors and about 25% at the postdoctoral entry level, A. There were 77 postgraduate students enrolled in 2003 and the total staff, including technical and general staff, was 343. The School is organized as three major research divisions, the titles of which reflect generally the diversity of the medical research disciplines covered by scientists working in the School. The divisions, Molecular Bioscience, Immunology & Genetics, and Neuroscience are comprised of independent groups and laboratories; currently 32 in number. There is also a High Blood Pressure Research Unit headed by the School's Director, and two collaborative initiatives: a Centre for Bioinformation Sciences (with the School of Mathematical Sciences) and the Australian Phenomics Facility.

PRIZES, HONOURS AND AWARDS
- Copley Medal of the Royal Society, Frank Fenner 1995
- Australia Prize, Graeme Laver (shared) 1996 (drug design, Relenza)
- Nobel Prize, Peter Doherty and Rolf Zinkernagel 1996 (Physiology or Medicine, role of the major histocompatibility complex)
- Albert Einstein World Award for Science, Frank Fenner 2000
- Prime Ministers Science Prize, Frank Fenner 2002

FELLOWSHIPS, AND SENIOR APPOINTMENTS
JCSMR numbers four Fellows of the Royal Society of London and nine Fellows of the Australian Academy of Science among its scientific staff.

A few examples of the numerous appointments held by JCSMR scientists include:
- Professor S Easteal, Editor Molecular Biology and Evolution, member of the Scientific Advisory Committee, Genetic Technologies Ltd;
- Professor C Parish, Editor-in-Chief of Immunology and Cell Biology and President of the Australasian Society for Immunology Inc.;
- Professor S Redman, section editor for Neuroscience and a Member of the Research Advisory Board of the Prince of Wales Medical Research Institute;
- Professor PW Gage, President of the Australian Physiological and Pharmacological Society;
- Prof JA Whitworth, Member, WHO Global Advisory Committee on Health Research, Co-Chair WHO/ISH Committee on Guidelines for Hypertension;
- Professor IG Young, Editor of DNA Sequence and a Member of the Biological Defence Advisory Committee, (Department of Defence).

<table>
<thead>
<tr>
<th>Number of Academic Staff (FTE):</th>
<th>91.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of General Staff:</td>
<td>196.6</td>
</tr>
<tr>
<td>Number of Students (EFTSU):</td>
<td>72</td>
</tr>
<tr>
<td>Higher Degree Research:</td>
<td>100%</td>
</tr>
<tr>
<td>Higher Degree Coursework:</td>
<td>0%</td>
</tr>
<tr>
<td>Under Graduate:</td>
<td>0%</td>
</tr>
</tbody>
</table>

| Number of pieces of work submitted for assessment: | 197 |
| Number of Assessors:                             | 23  |
| Number of staff with work submitted:             | 68  |

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<tr>
<th>External assessment</th>
<th>% ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
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<tbody>
<tr>
<td></td>
<td>70%</td>
<td>32%</td>
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Chapter 2: The Quality of Research 53
BIBLIOMETRIC ANALYSIS

<table>
<thead>
<tr>
<th>Discipline</th>
<th>No of Pubs</th>
<th>Citations Per Publication</th>
<th>Impact relative to World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry and molecular genetics</td>
<td>343</td>
<td>9.76</td>
<td>1.13</td>
</tr>
<tr>
<td>Immunology and microbiology</td>
<td>171</td>
<td>10.43</td>
<td>1.42</td>
</tr>
<tr>
<td>Clinical Sciences</td>
<td>126</td>
<td>8.75</td>
<td>1.73</td>
</tr>
</tbody>
</table>

EDUCATION

One of the primary aims of the School is to train the medical researchers of the future. Most postgraduate students are carrying out research directed towards a thesis for a PhD degree. We also share supervision of Honours students with the ANU Faculties and occasionally with other institutions.

The JCSMR policy is to increase student numbers in line with the School’s operating budget, anticipated new funding through the Australian Government’s Research Training Scheme, and staff capacity to provide high quality supervision. In 2003 there were 68 PhD students, 2 Masters students and 7 Honours scholars, a total of 77. Figures for previous years were: 84 in 2002, 96 in 2001 and 101 in 2000, illustrating the increasingly competitive climate in Australia for high quality postgraduate students. Consistently around 30% of JCSMR local students attract Australian Postgraduate Awards.
ACADEMIC UNIT PROFILE

RESEARCH SCHOOL OF PHYSICAL SCIENCE AND ENGINEERING (RSPhysSE)

Major Disciplines: Physical Sciences, Chemical Sciences, Engineering.

Other disciplines: Earth Sciences, Psychology, Health Sciences.

RESEARCH
The Research School of Physical Sciences and Engineering (RSPhysSE) is one of the four foundation research schools in the IAS. Much of the research in the School is interdisciplinary, covering broad areas that mainly lie within the physical and chemical sciences and engineering. There are particular strengths in:

- Non-linear science and photonics
- photonic devices
- nuclear physics
- materials science and engineering
- quantum and atom optics
- plasma physics
- atomic and molecular physics
- theoretical physics
- mesoscopic and nanomaterials
- soft matter and complex materials
- physical chemistry.

There are also significant efforts in:

- biophysics
- environmental research
- mathematical physics
- geosciences.

The School houses major facilities that are mostly unique within Australia to support nuclear physics, plasma physics, accelerator mass spectrometry, semiconductor growth by MOCVD, ion implantation research and optoelectronic device fabrication, with substantial equipment to support materials science, including crystal growth, materials production and processing, thin films and materials analysis, atomic force measurement, atomic and molecular physics and laser physics. The School also has a liquid helium plant with recycled helium gas and extensive and well equipped mechanical and electronic workshops that have provided purpose-built equipment and instrumentation to support its research. Such capabilities provide a major training ground for highly skilled technical staff.

The School's research focus is not only to conduct fundamental and applied research at the very highest international level but also, wherever possible, to exploit the results of its research by interaction with industry and appropriate commercialisation. There are currently more than 20 separate contracts with industry, some involving joint grants from government. There are more than 35 active patent families. Two spin-off companies are currently exploiting research from the School in the areas of biomedical diagnostics and polymer optics.

| Number of Academic Staff (FTE): | 112.9 |
| Number of General Staff: | 97.6 |
| Number of Students (EFTSU): | 79 |
| Higher Degree Research: | 100% |
| Higher Degree Coursework: | 0% |
| Under Graduate: | 0% |

Number of pieces of work submitted for assessment: 585
Number of Assessors: 24
Number of staff with work submitted: 128*

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<th>External assessment</th>
<th>%ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
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<tbody>
<tr>
<td></td>
<td>83</td>
<td>40</td>
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</table>
with a further company in the area of high density memory storage being established. In addition, the School was the driving force behind a grant from AusIndustry ($2.7 million) to create better links between the country’s materials research capabilities (in universities and government laboratories) and industry.

The School recognises that much top flight research, particularly in experimental endeavours, necessarily involves international collaboration in order to harness the most appropriate capabilities and expertise to address research challenges. Over the period of the review, the School has had more than 150 national and 350 international collaborative research projects that have resulted in at least one joint publication per collaboration, and more than 50% of its publications have included at least one author who is not from the ANU. There are more than 40 international MOUs with the School.

PRIZES, HONOURS AND AWARDS
Staff and students of the School have received a number of awards and prizes and many staff have been elected to prestigious academies and societies. The following is a summary status report for academics and students covered by the review:

- **Academy elections**: 2 FRS, 1 IEEE fellow, 13 fellows of the Australian Academy of Science, 7 fellows of the Australian Academy of Technological Sciences and Engineering, more than 25 fellowships of international professional societies.

- **Major academic prizes and awards** over the review period include: the Marconi Prize, the Australia Prize, Harrie Massey Prize (Allan Snyder), two Federation Fellowships (Yuri Kivshar and Barry Luther-Davies), two Pawsey medals (Robert Elliman and Yuri Kivshar), Tage Erlanger Guest Professorship (Barry Ninham), 1995 CSIRO Medal (Allan Snyder and John Mitchell), IEEE Third Millennium Medal (C Jagadish), David Syme Research Prize (Stephen Hyde), Lyle Medal (George Dracoulis), JG Russell Award (Andre Rode), Leonard Medal (Ross Taylor), Plasma Science and Technology AVS Prize (Rod Boswell), COSPAR International Cooperation Prize (John Carver), Stephanos Pnevmatikos International Award (Yuri Kivshar).

- **Student prizes** include: four awards of the Bragg medal for best Australian physics thesis, gold and silver medals at Materials Research Society conferences, two graduate student fellowships from the IEEE, an Australian-American fellowship, a Lawrence fellowship, a DAAP Scientific fellowship and more than 40 prizes for best poster or best student oral presentation at international and regional conferences.

**BIBLIOMETRIC ANALYSIS**

<table>
<thead>
<tr>
<th>Discipline</th>
<th>No of Pubs</th>
<th>Citations Per Publication</th>
<th>Impact relative to World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Sciences</td>
<td>1037</td>
<td>5.28</td>
<td>1.41</td>
</tr>
<tr>
<td>Information Sciences and Engineering</td>
<td>185</td>
<td>3.68</td>
<td>1.76</td>
</tr>
<tr>
<td>Chemical Sciences</td>
<td>167</td>
<td>4.85</td>
<td>1.32</td>
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**EDUCATION**
During the period of the review the School has had around 135 (ANU enrolled) graduate research students, almost all at PhD level as well as more than 70 undergraduate Honours students from Physics and Engineering. The School has also hosted (and co-supervised) a number of PhD and Honours students from other universities across Australia, as well as students from overseas universities. Usually, it is the unique research programs, facilities and expertise or collaborations that have attracted such visiting students to the School. Indeed, up to 50% of the School’s research students either collaborate with external researchers as part of their program or undertake part of their research at overseas institutions. About 98% of students that commit to a research project complete their course (PhD or Masters), with around 60% of PhD students completing in under 4 years.
COMMENTARY
Almost 40% of the engineering journal publications output from the ANU derive from about 30 staff in RSPhysSE. These publications appear mainly in high impact journals and have citation rates more than 70% above the world average.

Assessors for the two subdiscipline areas in which the RSPhysSE research is focused ranked the ANU effort in the top 25% of universities world-wide. More than half of the publication outputs over the review period have come from early to mid-career researchers, which suggests a healthy future for engineering research within RSPhysSE.

In recent years there have been growing teaching links and research collaborations between FEIT and RSPhysSE in areas of materials science, photonic devices and telecommunications.
ACADEMIC UNIT PROFILE

RESEARCH SCHOOL OF PACIFIC AND ASIAN STUDIES (RSPAS)

**Major Disciplines:** Asian and Pacific Studies, Economics, Policy and Political Science, History and Archaeology, Linguistics, Anthropology and Gender.

**Other disciplines:** Environmental Research, Geography, Sociology, Australian Indigenous Studies

**RESEARCH**

The RSPAS is one of the founding Schools of the IAS. It was created within a vision that recognized the importance of the Asia–Pacific region to the future of Australia. For more than fifty years, the School has sought to fulfil that vision through its efforts to be Australia’s pre-eminent centre for research and advanced academic training on the region. The School’s research focus is on four defined areas of the Asia-Pacific region: Northeast Asia, Southeast Asia, South Asia and the Southwest Pacific.

Through its continuing research and training, the School has created and fostered an unparalleled network of academic and research relationships throughout the Asia–Pacific region.

RSPAS has one of the largest concentrations of expertise on the Asia–Pacific region in the world. It is administratively organized into four Divisions: 1) Economics, 2) Pacific and Asian History, 3) Politics and International Relations and 4) Society and Environment plus a Director’s Section which includes the Strategic and Defence Studies Centre and the Northern Australia Research Unit in Darwin. It supports research in nine major disciplines: Anthropology, Archaeology, Economics, History, Human Geography, International Relations, Linguistics, Political Science and Strategic and Defence Studies. In recent years, it has added to this expertise a focus on the study of Gender Relations, Research Management and Governance. Each of these disciplines and areas of study carries out its own research, has its own academic training program and hosts both national and international visitors.

The work of this Research School is solidly based on disciplinary expertise but its great strength is in its research cooperation across disciplines. This means that for most members of the School, some publications are disciplinary-oriented and some publications may be interdisciplinary and regionally oriented. Often these publications are directed toward issues specific to countries within the region. Academic staff are urged to publish in regional journals as well as in international journals and, where possible, in regional languages. The School prides itself in having staff who are able to engage in academic dialogue with colleagues in most of the major languages of the region.

| Number of Academic Staff (FTE): | 88.5 |
| Number of General Staff: | 95.8 |
| Number of Students (EFTSU): | 296 |
| Higher Degree Research: | 54% |
| Higher Degree Coursework: | 46% |
| Undergraduate: | 0% |

| Number of pieces of work submitted for assessment: | 994 |
| Number of Assessors: | 79 |
| Number of staff with work submitted: * This number includes fractional and adjunct appointments and all grades of academic staff. | 155* |

**External assessment**

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<tr>
<th>% ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
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<tr>
<td>73</td>
<td>31</td>
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HONOURS
Sixteen members of the School have been elected to the Academy of the Social Sciences in Australia and seventeen members to the Academy of the Humanities. This division is indicative of the work of the School as a whole, which is evenly divided between research in the social sciences and in the humanities.

EDUCATION
At present RSPAS has more than 180 students enrolled in the PhD degree program. Most are full-time students. Students come from more than 27 different countries.

RSPAS has had a long-standing policy of attracting a 50%/50% mix of domestic and overseas graduate students. Students with the appropriate qualifications and background are selected for admission on the basis of their research interests and proposed research projects. Each student’s project becomes part of the on-going research program of the area into which the student is admitted. A high percentage of student theses result in important books that appear either in English or in the language of their author – or, often, in both languages.

In addition to PhD enrolments across the School, the Department of International Relations, the Strategic and Defence Studies Centre and the Graduate Studies in Sustainable Heritage Development provide Masters degree programs.
ACADEMIC UNIT PROFILE
RESEARCH SCHOOL OF SOCIAL SCIENCES (RSSS)

Major Disciplines: Economics, Policy and Political Science, Demography, Sociology, History, Philosophy, Law.

Other disciplines: Health Sciences, Psychology, Indigenous studies

RESEARCH
RSSS in 2003 was made up of the following programs, projects and centres: Economics, Political Science, History including Indigenous History, the Australian Dictionary of Biography, Philosophy, Demography and Sociology, Law, the Regulatory Institutions Network and the Centre for Tax System Integrity, Social and Political Theory, the Research Evaluation and Policy Project, the Social Policy Evaluation Analysis and Research centre, the Australian Centre for Social Research, and the Social Science Data Archive. As a research institute, the School provides leading scholars with a unique opportunity for sustained work on central problems and provides younger scholars and research students with an ideal environment in which to build research careers. Work in the School can be categorised as theoretical or as applied, but much of it straddles this familiar but often artificial divide and, moreover, cuts across the usual disciplinary boundaries. The School is strongly committed to interdisciplinary and multidisciplinary work (building on our disciplinary strengths) and a number of scholars have submitted work for assessment to more than one panel.

RSSS is actively engaged in national policy formulation through independent commentary, direct participation in policy processes, writing research reports for and carrying out research funded by government agencies, and interactions with the public service. The School maintains a strong research infrastructure of particular significance to the Australian research community including: the Social Science Data Archives (the only comprehensive and interdisciplinary data archive in Australia); the Australian Dictionary of Biography; the Research Evaluation and Policy Project. It also supports an active program of conferences involving participants from a broad range of institutions located elsewhere in Australia and overseas. The School has a very successful Visiting Fellows program which brings distinguished international scholars to the School and Australia more generally.

PRIZES, HONOURS AND AWARDS
- Professor J. Braithwaite and Professor P. Drahos, Grawemeyer Award For Ideas Improving World Order, 2004.
- Professor M. Davies, Hempel Lectures, Princeton University, 2003.
- Professor J. Braithwaite, Australian Research Council Federation Fellowship, 2002.
- Professors J. Caldwell and F. Jackson, ISI Citation Laureates 2004.
- Professor J. Wacjman, Visiting Centennial Professor, LSE, 2001–3.

| Number of Academic Staff (FTE) | 87 |
| Number of General Staff         | 77.9 |
| Number of Students (EFTSU)      | 108 |
| Higher Degree Research          | 92% |
| Higher Degree Coursework        | 8%  |
| Undergraduate                   | 0%  |

| Number of pieces of work submitted for assessment | 769 |
| Number of Assessors                      | 68  |
| Number of staff with work submitted:     | 126* |

*This # includes fractional and adjunct appointments and all academic staff

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<th>External assessment</th>
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<tbody>
<tr>
<td>% ANU in Top 25%</td>
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<tr>
<td>% ANU in Top 5%</td>
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</table>

**FELLOWSHIPS AND SENIOR APPOINTMENTS**

Researchers in RSSS currently hold the following fellowships:

- Twenty two fellows of the Academy of the Social Sciences in Australia;
- Four fellows of the Academy of the Humanities in Australia;
- Two corresponding fellows of the British Academy;
- Two fellows of the Royal Historical Society.

Senior appointments include:

- Professor P. McDonald, Chair, Committee on Scientific Activities and Council member of the International Union for the Scientific Study of Population
- Professor R. Gregory, member, Prime Minister’s Science, Engineering and Innovation Council Working Group, Promoting Healthy Ageing in Australia
- Professor P. Grabosky, Deputy Secretary General, International Society of Criminology
- Professor R. Rhodes, President, UK Political Studies Association
- Dr I. Marsh, Director of Research, Committee for Economic Development of Australia
- Professor R. Goodin, Executive Committee of the American Political Science Review.
- Dr T. Rowse, Australian Studies Chair at Harvard.

**EDUCATION**

Higher Degree Research students are enrolled in all of the areas of study represented by the RSSS. A sample of research topics from students commencing their research in 2004 gives an indication of how are wide-ranging these are: from a comparative study of indigenous populations in Australia, Hawaii and British Columbia to the evolution of Australian electoral administration. Other topics include knowledge diffusion, the dynamics of unemployment, illegal migration in Europe, asset prices and confidence over the business cycle, school bullying and impulsivity, restorative justice and peace operations, and money laundering and legal norms.

The Research School of Social Sciences is an outstanding place to study. It is the only research institute devoted to the social sciences in Australia, and one of the very few in the world. Graduate students in RSSS will routinely engage with some of Australia’s most distinguished and productive scholars during their time in the School, and have access to leading scholars from around the world through an active visitors program. The Research School places a strong emphasis on research of the highest quality, and promotes a collegial atmosphere in which students are considered to be active and independent researchers. The Research School provides outstanding facilities (rooms, computers, libraries, support to attend conferences, etc), and support (supervisory panels, graduate convenors within each academic program, and in-School administrative support).

**COMMENTARY**

In reading the ratings it is important to bear in mind that RSSS included all academic staff and fractional and adjunct appointments. Obviously the number of junior staff with work in the top 5% group especially is smaller than for senior staff.

The reason for the relatively small difference between the 5% and 25% figures for Sociology is the relatively large number of junior researchers in the area combined with a very strong senior group.

All major disciplines in the School receive good ratings and strong narratives from the assessors. There is some reason to think that some of the strongest parts of the School had ‘hard’ markers. For example, the narrative from assessors on Law is particularly strong but
the ratings are below the RSSS average. In assessing the figures for Economics it should be remembered that the School has of late increased its focus on applied economics work with policy implications. This is entirely appropriate for a research group in the National Capital but does mean a loss in international visibility. Philosophy is a strength in the Australian university system and the School has been a very big contributor to this, as the results attest.
ACADEMIC UNIT PROFILE

CENTRE FOR RESOURCE AND ENVIRONMENTAL STUDIES (CRES)

Major Disciplines: Environmental Studies


RESEARCH

The research at CRES covers, broadly: spatial analysis techniques as applied to digital terrain and hydrological modelling, assessment of biodiversity and assessment of the impacts of projected climate change; conservation biology and landscape ecology incorporating extensive field programs in southeastern Australia; integrated water resources assessment addressing environmental problems in the coastal zone and the Pacific; the Integrated Catchment and Management Centre; an environmental economics program hosting the Economics and Environment Network at the ANU; the urban environment focusing on economic and social activities of cities which are creating increasing stresses on environmental resources.

Research in public policy and institutions has provided a framework for interdisciplinary research that explores the underlying attributes of policy and institutional problems in sustainability; the social dimensions of sustainability has been added with research in environmental history and ecological humanities – the Environmental History Network and the Cultural Environments Initiative at the ANU.

PRIZES, HONOURS AND AWARDS

- 2003 Professor Ian White awarded the Centenary Medal for Service to Australian society in environmental science and technology.
- 2003 Professor David Lindenmayer topped The Bulletin's "Smart 100 – Environment” list.
- 2003 Professor David Lindenmayer received Doctor of Science from the ANU.
- 2003 Dr Libby Robin received the Victorian Premier's Literary Award for Science Writing.
- 2001 Dr Quentin Grafton included in the list of the world's Top 500 Economists (1994-1998).
- 2001 Professor Michael Hutchinson received a Merit Award for creativity and innovation, exceptional achievement, and collaboration and partnership from Natural Resources Canada.
- 1999 Dr David Lindenmayer received the Eureka Prize for Environmental Research.
- 1999 Dr David Lindenmayer received the Whitely Award for Conservation Biology.
- 1998 Professor Henry Nix received Order of Australia.

| Number of Academic Staff (FTE): | 16.6 |
| Number of General Staff: | 15.9 |
| Number of Students (EFTSU): | 46 |
| Higher Degree Research: | 100% |
| Higher Degree Coursework: | 0% |
| Undergraduate: | 0% |

| Number of pieces of work submitted for assessment: | 112 |
| Number of Assessors: | 40 |
| Number of staff with work submitted: |
  * This # includes fractional and adjunct appointments and all grades of academic staff |
  * 18 |
| External assessment |  |
| %ANU in Top 25% | 58% |
| % ANU in Top 5% | 19% |
FELLOWSHIPS AND SENIOR APPOINTMENTS

- 2003 Professor Ian White appointed Chair of the Oyster Research Advisory Committee.
- 2003 Dr Stephen Dovers appointed Adviser, Integration Initiative, Land & Water Australia.
- 2002 Dr Robert Heinsohn elected Vice-President of the Australasian Society for Study of Animal Behaviour.
- 2002 Professor Robert Wasson appointed Chair of the ACT Sustainability Expert Reference Group.
- 2001 Professor Ian White appointed member of Technical Advisory Board UNESCO International Hydrological Programme.
- 2001 Dr Anna Carr received one of five international fellowships offered by the Rockefeller Foundation's Ecological Conversations Program at the University of Oregon.
- 1999 Professor Ian White elected Fellow of the American Geophysical Union.
- 1999 Professor Ian White elected to the Australian Academy of Technological Sciences and Engineering.

EDUCATION

CRES maintains an active PhD program, with 51 students in 2003, around 4 students per eligible academic. CRES has enhanced student supervision by introducing tools to assist student/supervisor communication and by formalising mentoring among students. PhD completion rate has been maintained at around 95%.

COMMENTARY

CRES’s mission is to address sustainable management of natural resource and the environment. Despite its modest size it has become highly respected nationally and internationally for its interdisciplinary research based on strong disciplinary expertise. This is attested by the very favourable assessors comments on CRES contributions to Environmental Research: e.g. “high quality of research but also the level of engagement with national and international communities”, “one of the top five landscape ecologists in the world”, “overall performance is very high by world standards”.

As for other groups engaged in interdisciplinary research, the assessors’ comments are generally stronger than the quantitative measures.

CRES places a high priority on, and has a proud record in, postgraduate training. As shown in Table 1 of the Executive Summary, CRES has the highest number of higher degree research students per academic researcher in the Institute of Advanced Studies.
Major Disciplines: Policy and Political Science, Demography, Anthropology, Sociology, Archaeology, History, Philosophy, Language Studies, Linguistics, Literature, Culture and Arts Criticism, Creative Arts, Indigenous Studies, Asian-Pacific Studies; and International Relations.

Other disciplines: Environmental Studies, Economics.

RESEARCH
Since 1995, staff members have published a total of 180 monographs, 54 edited books, 467 articles in refereed journals, (455 in non-refereed journals), 537 book chapters, 59 chapters in Conference proceedings, 46 reports, 79 reviews, 24 catalogues, 16 electronic publications, 48 musical compositions, 10 curated exhibitions and 201 musical performances. Over a 4-year period, 1999-2002, the Faculty has excelled in research training, with more than 120 PhD candidates and 52 Masters by Research candidates receiving their degrees.

RESEARCH CENTRES
In a number of respects, the Faculty of Arts at ANU is unique in Australian higher education. For example, it has been an unparalleled progenitor of successful research centres: the Humanities Research Centre; the Centre for Cross-Cultural Research; the Australian National Dictionary Centre; the Centre for Arab and Islamic Studies (the Middle East and Central Asia); and the National Europe Centre all trace their genesis to the staff and support of the Faculty. The School of Archaeology and Anthropology is the largest group within the collaborative Centre for Archaeological Research (located in the Research School of Pacific & Asian Studies at ANU), which coordinates the research efforts of archaeologists and palaeologists as well as heritage managers in the ACT region. Most recently, the Faculty expanded its range by joining a research centre which had been developed by the University of Melbourne and Charles Stuart University: the Centre for Applied Philosophy and Public Ethics –one of the most significant such research bodies in the field of applied ethics.

PRIZES, HONOURS AND AWARDS
The Faculty counts among its current staff 14 members of the Australian learned academies, the Australian Academy of Humanities and the Academy of Social Sciences in Australia.

Notable current achievements include the appointment of Professor Ann Curthoys as the 2004 Group of Eight Visiting Professor at Georgetown University and the naming of Professor Matthew Spriggs as one of the inaugural Thomson ISI 'Citation Laureates' at a National Press Club event in April of this year.

Dr Philip Rose has accepted a British Academy Visiting Professorship at the Edinburgh University Joseph Bell Centre for Forensic Statistics and Legal Reasoning (tenable in June 2004) and, since January 2003, Professor Amin Saikal has been invited to present keynote addresses at 9 international conferences, including events hosted by the United Nations.
University in Tokyo and by Princeton University’s Liechtenstein Institute on Self-Determination.

Professor David Williams has just been awarded a Chevalier de l’Ordre des Arts et Lettres by the French Government for his contribution on a global level to the promotion of the Arts.

Professor John Warhurst (Politics) has, since January 2003, been the Chair of the Australian Republican Movement and has continued to publish prolifically in the discipline of Australian Political Science. Chaitanya Sambrani (School of Art) has been invited to present his research at a showcase address at an international conference in Seoul in May, which addresses the question of globalism and its impact upon contemporary art in Asia; and Geoffrey Lancaster (School of Music) has just performed as an invited keyboard soloist with orchestras and early music ensembles in Switzerland and Austria. This is typical of the high quality of international involvement of Faculty staff in their fields of disciplinary excellence.

The Faculty’s teaching staff regularly receives University Teaching Awards and one – Dr Alastair Greig (Sociology) – is the only Australian academic to have received a coveted National Undergraduate Teaching Award twice (in 1997 and 2003).

Another example of the standing of research-led undergraduate teaching was the 2002 award of France’s highest academic honour, the Chevalier des Palmes Académiques, to Dr Peter Brown (French) for the eminence of his career contribution to French language and culture. Meanwhile, extensive use is made of information technology for research, teaching and professional practice and considerable emphasis is being given to the deployment of Flexible Delivery strategies. To cite two examples; the online course ‘The Sociology of Disasters’, recently designed by Dr Andrew Hopkins (Sociology), is already in demand internationally and Dr Hopkins has established an outstanding reputation in this field of teaching and research.

Members of the Faculty have been recipients of international awards in recognition of their research contribution to their respective disciplines. Some of these include – Dr Nicolas Peterson (Anthropology) - awarded the Lucy Mair Medal for Applied Anthropology by the Royal Anthropological Institute (1999); Professor Anna Wierzbicka (Semantics) was elected a member of the Russian Academy of Sciences (1999); Professor Matthew Spriggs was awarded the Vanuatu General Service Medal (2002), for service to archaeology in Vanuatu – he was also elected a Fellow of the Society of Antiquaries, London (2002). Several members of the current academic staff and a number of Emeritus Professors were also recently awarded Centenary Medals for their services to Australian Society.

**EDUCATION**

The Faculty of Arts is the largest Faculty of the Australian National University. It has more than 3,200 students, 10% of whom are postgraduate researchers. In January 2004, the most far-reaching amalgamation in recent ANU history occurred when the National Institute of the Arts was merged with the Faculty of Arts. This amalgamation created not only the largest Faculty (and organisational entity) in the University – with almost one-third of the total undergraduate student population – but also paved the way for collaborations under the rubric of ‘ANU Arts’ which had never before been considered. The first fruits of this collaboration can be seen in the new BA in New Media Arts which will commence in 2005. The professorial head of the CNMA will also be Head of the Drama program leading to further synergies in this area.

The Faculty of Arts now comprises 196 academic staff who are organised in ten units including the Schools of Archaeology & Anthropology; Art; Humanities; Language Studies; Music; and Social Sciences, as well as the Australian National Dictionary Centre, the Centre for Arab and Islamic Studies and the Centre for New Media Arts.

**Teaching Programs**

In 2003 the Faculty reported to the Deputy Vice-Chancellor (Education) on a number of iLearning initiatives. This report was prepared in response to a recommendation of the
Review of Undergraduate Teaching in which each Faculty Dean would review their undergraduate programs to provide more learning opportunities based on ANU’s research involvement in their fields and to empower, at a local level, the University’s commitment to iLearning. The Faculty of Arts report highlighted a range of initiatives undertaken within the Faculty that are consistent with the aims of iLearning.

Since the ANU Review of Undergraduate Education, the Faculty has established a Teaching and Learning Committee for the purposes of advising on the development and implementation of education policies of the Faculty relating to all course-work award and non-award programs of study.

**Research Degrees**

2004 was the first year in which the Faculty offered the PhB program. This a new research-focused undergraduate degree, designed for students who want to study, in depth and at a highest level, any of the 38 disciplines offered in the Faculty of Arts. This involves working closely with a member of the academic staff as a mentor and research advisor. Experts from any ANU faculty, centre or research school may deliver course content.

The Faculty supervises a significantly higher number of doctoral candidates (366 as at 30 March 2004), in a wider range of disciplines, than any other part of the University.

**COMMENTARY**

The research performance of the Faculty of Arts has been achieved in the context of:

- **Large teaching and research supervision loads.**
  Over 3000 students are enrolled in the Faculty. In some areas the enrolments are particularly heavy. In 2003 the Introduction to Politics course had over 450 enrolments, the Introduction to International Relations course had over 400. Later year units in International Relations ranged from 100 to 300. There were also large numbers in Introducing Anthropology (over 200), Fundamental Ideas in Philosophy (nearly 200), the Sociology of Third World Development (180). The History courses on the First and Second World Wars had over 150 enrolments each. Many other courses had one hundred or more enrolments.

  Most disciplines in the Faculty have strong Honours Programs. English, Philosophy, Political Science, Sociology and Visual Arts all had over 20 Fourth Year Honours students in 2003, each of whom had a supervisor for an Honours thesis or project.

  Post-graduate supervision is also substantial with the Faculty having over 200 EFTSU in Research degrees. There are another 45 EFTSU in graduate coursework programs.

  Total student load increased by 26 per cent from 2001-2003.

- **Innovation in teaching.**
  A number of new degree programs have been introduced, including the BA in International Relations, the Bachelor of Archaeological Practice, the BA in New Media Arts, the Bachelor of Philosophy (PhB). An MA in Museums and Collections has also been introduced.

- **The Faculty’s commitment to teaching can be demonstrated by the fact that of the sixteen awards for excellence in teaching made between 2000 and 2003 eight went to members of the Faculty of Arts.**

Work on Australian literature, history, politics, archaeology may not have received full consideration.

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In some, but not all, areas where disciplines cross the Faculties and the IAS the assessors seem to have focussed on the work conducted in the IAS. Thus there may be a skewing of assessments towards research done in the Research Schools in the fields of History, Linguistics, International Relations, Philosophy and Political Science.
ACADEMIC UNIT PROFILE

FACULTY OF ASIAN STUDIES


Other disciplines: International Relations, Political Science, Literature, Philosophy

Research
The Faculty of Asian Studies (FAS) is the only faculty in Australia dedicated solely to research, teaching and outreach on Asia. It cooperates with the Research School of Pacific and Asian Studies (RSPAS) and the Asia Pacific School of Economics and Government (APSEG) within the National Institute for Asia and the Pacific (NIAP). Current research cooperation involves APSEG, The Strategic and Defence Studies Centre, The Department of Pacific and Asian History and the Faculty of Arts.

The Faculty focuses on Asian languages and language-based research in a range of humanities and social science areas. Staff are particularly concerned with the analysis of primary sources in Asian languages.

Faculty staff have both research and teaching responsibilities. Some language teachers write materials such as text books and CD Roms which sometimes do not show up as research.

Prize, Honours and Awards
- Prof. Ileto – Fukuoka Prize, 2003; Ford Lectures (University of Hawaii); Philippine National Book Award for History, 1999.
- Prof Louie and Prof. Hooker – Choice Award for Outstanding Academic Books
- Prof. Hooker, Prof. Ileto and Prof. Milner – Most cited books on Southeast Asia, listing by the United States Association for Asian Studies, for the American Council of Learned Societies, 2003
- Dr Loofs-Wissowa – Palmes Academiques, 1999
- Dr Kumar and Prof. De Crespiigny – Centennial Medal
- The Interactive Teaching Disc ‘Learning Thai Script’ – Australian Society for Computers in Learning
- Prof Milner – Raffles Visiting Professor of History (Distinguished Visiting Professor Scheme); Visitor, Institute for Advanced Study, Princeton; Golay Lecturer (Cornell University); Cunningham Lecture (Academy of the Social Sciences)
- Dr Reynolds – Golay Lecturer (Cornell University)

Number of Academic Staff (FTE): 29.5
Number of General Staff: 7
Number of Students (EFTSU): 510
Higher Degree Research: 10%
Higher Degree Coursework: 5%
Undergraduate: 85%

Number of pieces of work submitted for assessment: 236
Number of Assessors: 35
Number of staff with work submitted: 33*

*This # includes fractional and adjunct appointments and selected academic staff in the two most junior grades.

External assessment

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<th>% ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
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<tbody>
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<td>71</td>
<td>24</td>
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</table>
FELLOWSHIPS AND SENIOR APPOINTMENTS

- 8 Fellows of the Australian Academy of the Humanities (Dr Ann Kumar was Vice President, 2000-2002)
- 1 fellow of the Academy of the Social Sciences in Australia (Prof. Milner gave the Academy's Annual Lecture in 1995)
- 2 Panel Members of the Australian Research Council
- 4 members of the Council for the Asian Studies Association of Australia
- Over the period reviewed, 2 FAS staff on the Federal Government’s Foreign Affairs Council, 1 on the Australia-Indonesia Institute and 1 on the Australia-China Council
- Dr Kumar, Honorary Professorship: Research Professor, Nordic Institute of Asian Studies (only the second such appointment to be made by the Institute)
- Dr Reynolds, Member of the Joint Committee on Southeast Asia, Social Science Research Council of the USA
- Prof. Milner, Co-Chair, Council for Security Cooperation in the Asia-Pacific (CSCAP); Panel Member, Australian Research Council; Advisory Council, AustralAsia Centre; The Asia Society; Council Asialink; Foreign Affairs Council
- Prof. Hooker, Co-organiser, Muslim Exchange Program, Australia-Indonesia Institute; Foreign Affairs Council; Australia-Indonesia Institute; Panel Member ARC;
- Prof. Wells, Founder and President, Korean Studies Association of Australasia; Executive member, International Advisory Committee of the Korea Foundation
- Dr de Crespigny, President of the Chinese Studies Association of Australia
- Since 1999, the Faculty hosted 4 Luce Fellows
- Dr Powers, Vice-President, Australasian Society for Asian and Comparative Philosophy
- Dr Reynolds, Chair, Southeast Asia Regional Advisory Panel, United States Social Research Council; Director, Centre for the Study of the Chinese Southern Diaspora (CSCSD)

EDUCATION

Language and Non-Language Courses
In view of the Faculty's involvement in both language and non-language teaching, it should be noted the leading role of research in these two broad areas is likely to be quite different. Whereas in courses in non-language fields such as history and social science the research expertise of staff is likely to determine course content directly and help to induct students into research roles, in language courses its impact is likely to be more indirect, for example, where the research expertise lies in linguistics, by influencing language teaching methodology. Many of the Faculty's language teachers are researchers in linguistics – as is clear from the number of Honours students who pursue linguistics research or go on to postgraduate work in the field.

On the non-language side, there is a close correlation between research activity as evidenced by publications and the courses taught by Faculty staff, for example, in the fields of history, philosophy and religious studies, literature, gender studies, international relations and politics.

Specific Research-Led Non-Language Courses
All of the non-language courses of the Faculty are research led, many focusing on specific countries and topics and taught by staff with strong research expertise in the areas concerned. The Faculty's foundation course, Individual and Society (A and B), taken by the great majority of students, has been 'issue' or 'problem' based since its inception 10 years ago. This year, for example, in the second semester students will decide for themselves which aspects of the selected broad topics they will research and in relation to which Asian countries, and share their results. At the other end of the scale, there are readings courses offered to individuals and small groups, in which the emphasis is less on working through a set course of readings than on student-initiated supervised exploration of a chosen topic. A Pre-Honours Research Seminar offers all students considering Honours the opportunity to try
their hand at a largish research undertaking, with the advantage of group support. A number of other courses, such as History and Theory, and Knowledge and Society, serve to focus attention on reflexive skills and issues to do with knowledge creation.
ACADEMIC UNIT PROFILE

FACULTY OF ECONOMICS AND COMMERCE (FEC)

Major Disciplines: Economics, Business and Commerce, Statistics (including Actuarial Science)

RESEARCH

Organizationally, research is facilitated within the three Schools’ structure, by a number of research groups and by a Research Committee headed by the Associate Dean (Research). A major centre of activity is the Australian Centre of Regulatory Economics, formed recently after national competitive bidding. This multi-million dollar education and research centre will be the focus of important developments in our nation with inputs, not just from the Faculty, but from other stakeholders in the ANU including the National Graduate School of Management, the Faculty of Law, the Asia-Pacific School of Economics and Government and the Regulatory Institutions Network. Other research groups include the Actuarial Studies Research Group, the Electronic Commerce Research Group and the Australian National Centre for Audit and Assurance Research.

The three schools have been in existence for three years, following a restructure of the Faculty in late 2000.

School of Business and Information Management

This school has grown rapidly in the last year with the introduction of the disciplines of Marketing and Management in addition to the existing disciplinary areas of Accounting, Information Systems, and International Business. The number of academic staff has increased from 17 to 44 over the past two years. Many of these new staff are junior appointments. The School has significant teaching responsibility with approximately 840 undergraduate students and 25 coursework graduate students. There has also been growth in the PhD program. There are currently 48 PhD students enrolled with supervisors in the school. The school places a very strong emphasis on high quality research performance by its staff. It has been very productive with respect to its research output over the last two years.

School of Finance and Applied Statistics

The School of Finance and Applied Statistics draws together staff with interests in the unique (within Australia) mix of statistics, actuarial science and finance. The mission of the School is to produce outstanding research and teaching, capitalising on the synergies between the three disciplines. The research activities of the School emphasize empirical research and related theory as motivated by applications. The academic staff of the School at the level of lecturer or higher comprise 6.5 statisticians, 8.5 in finance and 3.5 actuaries, with overlapping interests in many areas of finance, statistics and applied statistics, actuarial practice and demography. The staff are a mix of senior appointees with significant international reputations and early career academics well on the way to establishing themselves. The School is one of only four Australian university units accredited by the Institute of Actuaries of Australia.

School of Economics

The School of Economics was formed through a merger of the previous Departments of Economics and Economic History and some members of the Department of Statistics and

| Number of Academic Staff (FTE):        | 89.5 |
| Number of General Staff:              | 25.3 |
| Number of Students (EFTSU):           | 1866 |
| Higher Degree Research:               | 4%   |
| Higher Degree Coursework:             | 6%   |
| Undergraduate:                        | 90%  |
| Number of pieces of work submitted for assessment: | 284 |
| Number of Assessors:                  | 29   |
| Number of staff with work submitted:  | 62*  |

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<th>External assessment</th>
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<td>% ANU in Top 25%</td>
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<td>63%</td>
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Chapter 2: The Quality of Research
Econometrics. The School has the largest concentration of economists on the ANU campus with 30 full-time posts ranging from Associate Lecturer to Professor. It is part of a wider ANU community that includes economists located in a number of research schools and centres. Synergies across these groupings often lead to collaborations and joint projects. For example, the School provides courses for the ANU-wide PhD program in Economics. The School of Economics provides a focal point for economics in the wider Australian context. National Conferences hosted by the School include those of the Australasian Econometric Society of Australia and the Economic History Society of Australia and New Zealand. The School also hosts up to five international visitors a year, with many more elsewhere on campus. ANU economists engage widely with user groups in business, government and overseas as advisors and consultants.

**EDUCATION**

The Faculty of Economics and Commerce prepares students for a wide range of careers including work as professional actuaries, economists, bankers, financial managers, accountants, management consultants, statisticians, fund managers, stock brokers, information systems professionals, marketers and international business specialists.

The students develop the ability to recognise and solve problems, and to make policy recommendations and management decisions. Graduates are expected to become competent professionals by building on the skills they have acquired through their degree and appreciating the value of an enquiring mind.

All the degrees offered by FEC are offered at both pass and honours levels and may also be taken as part of a combined program with another degree. The degree programs have been designed to allow students to meet the educational entry requirements for relevant professional associations including the Institute of Actuaries of Australia, CPA Australia, The Institute of Chartered Accountants in Australia, Chartered Institute of Management Accountants, Australasian Institute of Banking and Finance, Finance and Treasury Association and the Chartered Institute of Company Secretaries.

In 2003 the Faculty supervised 84 PhD students and 5 M. Phil students.
ACADEMIC UNIT PROFILE
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY (FEIT)

Major Disciplines: Information Sciences and Engineering.

Other disciplines: Mathematical Sciences, Physical Sciences, Chemical Sciences

RESEARCH
The Faculty of Engineering and Information Technology is comprised of two departments:

Department of Computer Science
Members of the Department have research expertise in parallel computing and programming languages, algorithms, virtual environments, software engineering and computational intelligence. Since 1993, the Department had substantial involvement in large co-operative research activities via the ANU/Fujitsu CAP Research Program, the Cooperative Research Centre for Advanced Computational Systems, and the SmartInternet Cooperative Research Centre.

The sudden growth in IT enrolments in 1999-2001 impacted on the research productivity of the members of the Department. With the recent decline in student interest, research productivity is rising, with 18 research active staff out of 21 (2 are at the Associate Lecturer level). Two staff have joint appointments with the Research School of Information Sciences and Engineering, and 5 staff participate in research focussed teaching buyouts including 1 Australian Professorial Fellowship.

The increase in research productivity is partly as a consequence of staff participating in the large co-operative projects that the Department continues to support. Thus, in the last ARC round, staff attracted 4 ARC Discovery grants and 1 ARC Linkage grant for a total of $1M over 3 years.

Department of Engineering
Research in the Department of Engineering focuses on several key disciplines, following a systems approach to the multidisciplinary nature of today’s engineering. The Faculty’s research permeates its educational activities, and is impregnated by them. 2003 marked the tenth anniversary of the first graduates from the ANU BE program. Since its inception the program has graduated 548 engineers who are working in a diverse range of fields.

Research staff includes 15 teaching and research academics, 5 research only academics and 12 engineers/research assistants. A mix of senior and early career researchers gives the department a solid foundation as well as projection into the future. There are 5 Professors, 3 Readers, 5 Senior Lecturers and 7 Lecturers. Among other distinctions, our staff have been awarded 2 ARC Professorial Fellowships (Profs James and Qin), one QEII (Dr Altermatt) and 2 APD (Drs MacDonald and Compston). In addition, the Centre for Sustainable Energy Systems employs 25 research only staff.
A large part of the research work in the department seeks to be relevant to industry. Strong collaborations have been built up with industrial organisations such as the Ford Motor Company, Origin Energy Solar Pty Ltd, Solahart, Roth and Rau Oberflaechentechnik AG, BPSolar Australia, and Aerosond. International collaborations are numerous and very active, particularly with universities in the US and institutes in Germany.

Experimental and theoretical investigations are conducted in the following areas: advanced manufacturing and production systems, control and robotics, materials engineering, semiconductor physics and technology, solar photovoltaic and thermal energy, and telecommunications and signal processing. The overarching integrated systems approach assists in creating a fertile environment and a closely-knit web of collaborations among staff and postgraduate students. Within every discipline, specialised research is conducted at the highest international standards.

**Prizes, Honours and Awards**

- Dr P. Altermatt, best poster award at the 14th International Photovoltaic Science and Engineering Conference, Bangkok, 2004
- Professor M. Cardew-Hall, co-recipient of the Paul Henderson Prize of the Institution of Mechanical Engineers, 2002
- The Beowulf style cluster supercomputer ‘Bunyip’ was awarded the international Gordon Bell Prize for best price performance on a significant parallel computing problem in 2000
- Dr H. Gardner, Krell Institute and Department of Energy, USA Undergraduate Computational Engineering and Science Award, 1997
- Professor T. Gedeon, Leadership Award for Outstanding Service to Asia-Pacific Neural Network Assembly, 2000
- Professor B. McKay, Australian Museum Eureka Prize for Critical Thinking, 2003

**Fellowships and Senior Appointments**

- Professor A. Blakers, Fellow, Australian Institute of Physics
- Professor M. Cardew-Hall, Fellow, Institution of Mechanical Engineers
- Professor M. James, Fellow, Institution of Electrical and Electronic Engineers
- Professor B. McKay, Fellow, Australian Academy of Science
- Professor B. McKay, Fellow, Australian Mathematical Society
- Professor A. Blakers is a member of the ACT Environmental Protection Technical Advisory Committee
- Professor A. Cuevas is a member of the Advisory Committee of the UNSW Key Centre for Photovoltaic Engineering
- Dr R. Clarke is a Board Member of the Australian Privacy Foundation, and Electronic Frontiers Australia, and a member of the Advisory Board of Privacy International
- Professor T. Gedeon is a member of the governing board of the Asia-Pacific Neural Network Assembly, and past President
- Mr T. Worthington is Director of the Publications Board of the Australian Computer

**Education**

The Faculty of Engineering and Information Technology is a teaching faculty within the Australian National University. The Faculty teaches 1070 undergraduate students in three undergraduate programs – Bachelor of Engineering (BE), Bachelor of Software Engineering (BSE) and Bachelor of Information Technology (BIT). The Faculty also has over 100 postgraduate students enrolled in its research degrees of Doctor of Philosophy (PhD) and Master of Philosophy and its coursework degrees of Master of Information Technology (eScience)(MIT), Master of Engineering (ME) and Master of Software Engineering (MSE). The masters programs were only introduced three years ago and the number of enrolments has nearly doubled in the past year. 25% of the Faculty’s students are international. The ME
and the MSE are one year programs with an additional second year which is research based (MSE(Hons) and ME(Hons). The new Honours programs are designed to allow students to continue to a PhD and students will have the opportunity to undertake research projects either in the Faculty or in one of the related Research Schools at the ANU.

The Faculty has dual responsibilities. While we need to maintain the highest professional standards for the majority of Engineers, Software Engineers and Information Technologists who are employed in industry after taking their undergraduate degree, we also introduce students to research projects at an early stage for those who seek careers in research. The Department of Engineering has a Distinguished Scholars program that allows students, under individual supervision, to undertake research projects in lieu of some courses. This has been outstandingly successful for the most able 15% of students.

In order to maximize our student’s exposure to the very best researchers in a wide range of fields, some specialist courses are delivered by Research School staff, in fields such as photonics and computer vision.

**COMMENTARY**

Of the 10 sub-areas in which papers from the Faculty were listed (1.1, 2.4, 2.6, 3.3, 3.4, 9.1, 9.2, 9.4, 9.5, 12.4 and 19.12), only six could be considered core to the Faculty’s operations. The Faculty encourages cross-disciplinary collaborations, but would not expect to meet ‘world class’ criteria in Psychology and Law for example. The Faculty does maintain a serious research effort in six sub areas. In the review, only three (2.6, 80% WC, 9.1 29% WC and 9.4, 75% WC) of the six have been properly assessed. The remaining three (1.1, 9.2 and 9.5) were either inadequately assessed from the Faculty’s perspective or not assessed at all.

The assessor of sub-area 1.1 read only three papers from the Faculty authored by Level C academics. The Faculty has six other researchers publishing in that field, two of whom are ARC Professorial fellows with outstanding records.

The Faculty’s output in sub-areas 9.2 and 9.5 has not been assessed at all. This would represent at least 40% of our research effort and includes output from five of the eight professors in the Faculty.

The Faculty welcomes the high ranking given by the assessors to areas 2.6 and 9.4 and accepts the assessors ranking for 9.1. However, given the shortcomings mentioned above, we believe that the data above cannot be used as a reliable indication of the Faculty’s overall research performance.
ACADEMIC UNIT PROFILE

FACULTY OF LAW

Major Disciplines: Law.

Other disciplines: Psychology, Asian Studies, Economics, International Relations, Biomedical Science.

RESEARCH
The Faculty includes or hosts 5 Centres, a number of informal networks, 2 interdisciplinary National Institutes, a practical legal training unit (Legal Workshop), and the National Judicial College of Australia.

The Faculty’s research activities are not strictly compartmentalised from its other activities. Teaching reduces time for research, but the Faculty exploits the synergies between its teaching, research and outreach activities, so that the wider tasks enrich research as much as they compete with it for time. An unusual degree of collegiality has seen the production of a number of major collective outputs (e.g. The Oxford Companion to the High Court of Australia (OUP, 2001)).

RESEARCH CENTRES AND OTHER RESEARCH ACTIVITIES:
The Faculty’s research effort is organised both through its specialist centres and through informal groupings and individual efforts. The specialist centres include the Centre for International and Public Law (CIPL), the Centre for Commercial Law (CCL), the Centre for Law and Economics (CLE), the Australian Centre for Environmental Law (ACEL), and the Australian Centre for Intellectual Property in Agriculture (ACIPA, externally funded by a $3.4 million grant over five years from the Grains Research and Development Corporation). Also established in 2003 was the Australian Network for Japanese Law (ANJeL).

The Faculty’s research effort is also manifested in:

- the Faculty’s production of two of Australia’s leading law reviews, the Federal Law Review and the Australian Yearbook of International Law.
- the growing number of higher degree research students (currently 25)
- the vigorous visitors program and faculty seminar program
- the location in and hosting by the Faculty of two major interdisciplinary research institutes, the National Institute of Social Sciences and Law (NISSL, Chair Professor Michael Coper) and the Australian National University Institute for Indigenous Australians (ANUIIA, Chair Professor Mick Dodson).

| Number of Academic Staff (FTE): | 48.9 |
| Number of General Staff:       | 34.7 |
| Number of Students (EFTSU):    | 1140 |
| Higher Degree Research:        | 1%   |
| Higher Degree Coursework:      | 33%  |
| Undergraduate:                 | 66%  |

| Number of pieces of work submitted for assessment: | 287 |
| Number of Assessors:                             | 21  |
| Number of staff with work submitted:             | 63* |

*This number includes fractional and adjunct appointments and all grades of academic staff.
HONOURS AND AWARDS
The Faculty’s research performance has varied over the decade as the staff profile has varied. In recent years, there has been a relatively high proportion of junior researchers, but even in promise, one constant has been their quality. Amongst the many honours by which senior staff have been recognised are election as Fellows of the Academy of Social Sciences in Australia (for example, Professors Don Greig and Hilary Charlesworth), appointment to one or more of the Orders of Australia (for example, Professors Peter Bailey, Dennis Pearce and Jack Richardson), and election to the American Law Institute (Professor Michael Coper).

EDUCATION
The Faculty has a student body in 2004 of around 1400 LLB students and 600 postgraduate coursework masters and diploma students, including the students in the Legal Workshop.

The research activities and outcomes in the Faculty of Law10 feed into the Faculty’s educational programs in multiple ways, general and specific.

Teaching informed by research
Academic staff in Law teach, on the whole, in the areas of their research interests and expertise, so that their teaching is directly informed by their scholarship.

Teaching and research informed by outreach
Staff outreach activities include sitting on tribunals, engaging in legal practice, and advising government and Parliamentary committees. This work is reflected in research projects, which in turn is reflected in both classroom teaching and teaching materials. Outreach also itself includes educational programs, such as human rights training, seminars, and continuing legal education. Indeed, there is a level of integration of the Faculty’s research, teaching and outreach activities,11 which makes their disentanglement a little artificial.

Research informs teaching not only at ANU but nationally
A facet of this integration is the phenomenon that ANU Law Faculty members have produced a disproportionate number of the leading texts, treatises and reference works prescribed or recommended for teaching purposes in Australian law schools. By way of example only, the 5th edition of Laying Down the Law (Butterworths, 2001) is prescribed in foundational courses in 25 out of Australia’s 28 law schools.

COMMENTARY
Most of the courses in the Faculty of Law have innovative components that are inquiry based or draw on research, and nearly all offer the opportunity for research and writing, critical thinking and problem solving. Around 70 final year students each year write a 10,000-word honours thesis. Courses such as Clinical Youth Law and Law Internship give opportunities for research and reflection on clinical or workplace based practical experience. Students also have a unique opportunity to attend and participate in the national conference organised by the faculty and for which the faculty is renowned—especially in international law.

The assessment of the research output of the faculty is 18% exceptionally significant and 65% world class is particularly gratifying for a faculty with a heavy teaching task and high student staff ratio. The assessors reports were uniformly good across disciplines and across staff levels, from junior to senior.

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11 Ibid.
ACADEMIC UNIT PROFILE
FACULTY OF SCIENCE

Major Disciplines: Mathematical Sciences, Physical Sciences, Chemical Sciences, Earth Sciences, Biomedical Sciences, Genes, Ecology and Evolution, Plant Sciences, Environmental sciences, Psychology, Geography.

Other disciplines: Information Sciences, Health Sciences.

RESEARCH
The Faculty of Science is a vibrant and energetic Faculty in which teaching is led by research and research has a strong base from interactions with students both graduate and undergraduate.

The Faculty's research is extremely diverse spanning social sciences (social aspects of the environment, geography, science communication, psychology) to biological sciences (botany and zoology, ecology and evolution, forestry, physical aspects of the environment, biochemistry and molecular biology) to physical sciences (earth and marine science, physics and chemistry) to mathematics.

The Faculty of Science produced about 10% of the University's publications (as measured using the Government returns from the University). The academic staff numbers are about 11% of the University total; given the nature of the ANU, this represents high output from this group.

Staff with time for research restricted by teaching responsibilities do not always have the opportunity to pursue research goals with long time horizons. Nevertheless many staff members in the Faculty have won major prizes from professional societies and memberships of academies and societies.

PRIZES, HONOURS AND AWARDS

Department of Physics
- 1999 Prof H. Bachor Humboldt Prize.
- 2000 Dr P.K. Lam Australian Insitute of Physics, Bragg medal.
- 2003 Dr P.K Lam and Warwick Bowen received the Eureka Prize for Inspirational Science (Australia wide competition).
- Professor H. Bachor is a Federation Fellow, an award of the Federal Government of Australia.
- Professor David McLelland is Chair of the Australian Consortium for Interferometric Gravitational Wave Astronomy.
- Dr Susan Scott elected a Member of the European Academy of Sciences.
- 2 Australia Research Council (ARC) Queen Elizabeth II Fellowships.
- 5 Australia Research Council Fellowship.
- 1 Federation Fellowship.

| Number of Academic Staff (FTE): | 147.1 |
| Number of General Staff: | 93.8 |
| Number of Students (EFTSU): | 1714 |
| Higher Degree Research: | 14% |
| Higher Degree Coursework: | 4% |
| Undergraduate: | 83% |

| Number of pieces of work submitted for assessment: | 780 |
| Number of Assessors: | 74 |
| Number of staff with work submitted: | 160 |

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<th>External assessment</th>
<th>% ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
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<td>61</td>
<td>20</td>
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</table>
• 14 International Exchange Fellowships (DAAD,Humboldt,DIST,IREX,Queens Trust,DITC).

Department of Chemistry
• Professor M. Humphrey received the inaugural Royal Australian Chemical Institute Organometallic Chemistry Award (1998) and the David Syme Prize (2002).
• Dr B. Flynn received the inaugural ACT Young Tall Poppy Award for outstanding research (2002).
• Two Fellows of the Royal Society.
• Two ARC Professorial Fellows, Professor Humphrey and Professor Pashley.
• Five Fellows of the Royal Australian Chemical Institute.
• Two ARC Australian Research Fellows.
• One ARC Australian Senior Research Fellow.
• Three ARC Australian Postdoctoral Fellows.

Department of Earth and Marine Sciences
• Professor S. R. Taylor, Walter Bucher Medal, American Geophysical Union for original contributions to the basic knowledge of the Earth’s crust.
• Professor R. J. Arculus presented the 1999 Clarke Lecture at the Royal Society of New South Wales for outstanding achievement in Geology.
• Professor S. F. Cox was the Ernst Cloos Memorial Lecturer in 2003 at Johns Hopkins University.
• Three Fellows of the Australian Academy of Sciences (Campbell, Taylor, Truswell).
• Two Fellows of the Mineralogical Society of America (Arculus, Eggleton).
• One fellow of the Australian Academy of Technological Sciences and Engineering (Ride).
• One Foreign Correspondent to the German Palaeontological Society (De Deckker).

School of Biochemistry and Molecular Biology
• Dr Barry Pogson, Goldacre Medal, Australian Society of Plant Scientists, 2000
• Dr Barry Pogson, Fenner Medal, Australian Academy of Science, 2000
• Dr Stefan Bröer, Plenary Lecturer, Second Wierzba Conference, Poland, 2002
• Professor K. Kirk, Roche Medal, Australian Society for Biochemistry and Molecular Biology (ASBMB), 2002
• Professor K. Kirk, ASBMB Plenary Lecturer, Federation of Asian and Oceanic Biochemistry and Molecular Biology Societies Congress, Bangalore, India, 2003
• Professor K. Kirk, Plenary Lecturer, Awaji International Forum on Infection and Immunity, Japan, 2004
• Dr Helen O’Neill, ANU Vice-Chancellor’s Award for Excellence in Postgraduate Student Supervision, 2004
• Dr Rosemary Martin, ANU Vice-Chancellor’s Award for Excellence in Undergraduate Teaching
• Dr Carolyn Behm, Fellow, Australian Society for Parasitology, 1999
• Dr Carolyn Behm, Chair, World Health Organization Scientific Working Group on ‘RNA interference in C. elegans as a means of identifying drug targets for filariasis’ 2003
School of Botany and Zoology

- Professor A Cockburn, Centenary medal for services to botany and zoology from the Australian Government 2003
- Dr W Foley – Lindsey Welsh Memorial Prize for Innovation in Near Infrared Spectroscopy 1998
- Dr P Olsen – Serventy Medal for outstanding contributions to Australian ornithology 1996
- Dr P Olsen – Whitley award for best natural history publication 2001
- Researchers in Botany and Zoology have obtained the following fellowships and senior positions:
  - Two fellows of the Australian Academy of Science (Professor A. Cockburn, Chair, Sectional Committee on Integrative Biology, 2003-)
  - Professor A Cockburn, Australian Research Council Advisory Committee on Biological Sciences

School of Resources, Environment and Society

- Professor Val Brown was awarded Officer in the Order of Australia
- Dr Brian Lees was awarded the AISIST Prize in 1997, the Land Victoria Fellowship in 1999, and the AURISA Eminent Individual Award in 1999
- Dr Geoff Cary was a member of the National Ministerial Bushfire Advisory Group.
- Dr Cris Brack is Chair of the IUFRO Group 4.02.03 on forest inventory
- Professor Peter Kanowski was appointed by the Prime Minister as one of the three panel members of the National Inquiry into Bushfires
- Professor Neil Gunningham has been advisor to the OECD and UNEP
- Dr Brian Lees is a Fellow of AURISA and the Spatial Sciences Institute
- Dr Rebecca Letcher is Secretary of the International Environmental Modelling and Software Society
- Dr Brendan Mackey has been Chair of the Earth Charter Education Advisory Committee, Chair of the Expert Advisory Committee for conservation planning in Cape York, Deputy President of the Australian National Centre for Sustainability, and a member of IUCN’s Environmental Law Commission and the Advisory Board to Catholic Ecocare Australia.

School of Psychology

- Professor John Turner, Invited to be keynote speaker at the annual conference of the Social Psychology Section of the British Psychological Society in September 2004, Liverpool UK; 2001 Second Herbert & Valmae Freilich Foundation Eminent Lecturer. Professor Turner was also appointed a Member of the International Scientific Council, European Summer Institute of Political Psychology, International Society of Political Psychology in 2001.
- Professor Don Byrne, Distinguished Service Award 2003, International College of Psychosomatic Medicine; presented a keynote address at the 15th World Congress on Psychosomatic Medicine in Athens 1999
- Professor William Levick, awarded the Paxinos-Watson Prize of the Australian Neuroscience Society 2001. “For the most significant refereed paper published in the neurosciences in the preceding calendar year by an Ordinary Member of the Society”. Shared with W. R. Taylor, S. He and D. I. Vaney (coauthors)
- Professor John Turner ARC Professorial Fellow 2003-2007
- Dr Elinor McKone, Queen Elizabeth II Research Fellowship 2004-2008
- Four researchers are Fellows of the Academy of Social Sciences of Australia (Turner, Byrne, Smithson, Gregson)
• One researcher is a Fellow of the Royal Society (Levick) and of the Australian Academy of Science.

Centre for Public Awareness of Science
• Dr Stocklmayer, Adjunct Professor Gore and Emeritus Professor Chris Bryant have all been awarded the AM within the Order of Australia, for services to science communication.
• CPAS, together with Questacon and Shell, were awarded the prestigious national Business and Higher Education Round Table Award in 1999.
• Emeritus Professor Bryant is a Fellow of the Australian Society of Parasitology and a past President.
• Professor Gore has received a number of national and international awards for his activities in the promotion of science.

Bibliometric Analysis:

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<td>Chemical Sciences</td>
<td>101</td>
<td>3.99</td>
<td>1.09</td>
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<tr>
<td>Biochemistry and molecular genetics</td>
<td>111</td>
<td>7.26</td>
<td>0.84</td>
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</table>

Education
The Faculty of Science offers a diverse range of undergraduate and postgraduate degree pathways. The Bachelor of Science has a flexible structure that enables students to pursue a broad science education, while specializing in an area or areas of the student’s choice across the range of disciplines in the faculty. Specific specialist science degrees are also offered, including biotechnology, medical science, psychology, photonics, resource and environmental management, forestry, science communication and computational science.

Postgraduate research degrees (PhD and M.Phil) are offered in all of the Faculty’s research disciplines. Postgraduate coursework degrees (Masters and Graduate Diplomas) likewise cover the range of science disciplines; with an emphasis on psychology, science communication and resource and environmental science; specialist taught programs include a taught Doctorate in Clinical Psychology; MSc in Science Communication; and the Master of Contemporary Science, specifically aimed at mid-career secondary Science teachers.

The undergraduate and postgraduate teaching loads are quite heavy: for coursework undergraduate and postgraduate the 120 equivalent full time teaching and research staff teach about 1450 equivalent full-time students. The staff-student ratios and the breadth of the disciplines combine to make this a very demanding job for the staff. As well, the same staff supervised 205 equivalent full time research students, a number which has been growing strongly in the last two years.

The Faculty has a high proportion of all research students on campus at around one-third of the total load within the Science, Engineering and Health Division. This is testament to the attractiveness of the Faculty as a place for a research higher degree, not only to its own students but also to a wide variety of students from outside ANU. In the last few years, to build numbers, matching the University’s strategic plan, scholarships have been created with Faculty resources.

The Faculty is the only Science Faculty in Australia in which entry standards have risen substantially whilst also having strongly rising load. Furthermore the Faculty, capitalising on
close relations with the IAS, has introduced a research-intensive undergraduate degree for elite students (those in the top 1% of students nation-wide) called the Bachelor of Philosophy (Honours). In this degree, students start individually supervised small research projects in their undergraduate years. Of the 24 courses in the first three years of the degree, 6 are these small research projects. In the fourth year, the students undertake a standard honours year. There are 28 new students in this degree this year, giving the Faculty a number of students in the top 1% studying single science undergraduate degrees or double science undergraduate degrees which is comparable to that for all Victorian universities (35), though Victorian universities collectively have between 10 to 20 times more students overall than does the ANU. Partly as a consequence of this, the lowest student entering the Faculty 3 years ago would have been in the top 30% but now the lowest student is in the top 20% nationwide.

**COMMENTARY**

One reason for the strong performance of the Faculty of Science in assessor ratings is the close connections that parts of the Faculty have with the IAS. Such connections can, and do, imbed research within the Faculty of Science within broader research programs at the ANU. There are benefits in critical mass, seminars, interaction of staff and students and much more. Furthermore, where the connections work well, there are joint appointments and joint involvement of staff in the education of advanced students, such as in the PhB and PhD. The connections are perhaps closest in the Faculty in the Departments of Physics and Mathematics, which also have the two highest percentages of publications in the top 25% in the Faculty. It is clear that in both cases the research in the Faculty has been greatly enhanced by its connection with the IAS.

Interestingly, the collaborations operate differently in Mathematics and Physics. In Physics, the collaboration operates both with RSPhysSE and RSAA. It is based on joint research interests, joint research programs such as the Centre of Excellence in Quantum Atom Optics and joint appointments. However, there is no over-arching structure for Physics and Astronomy, making the allocation and responsibility for budgets clear and simple. In Mathematics, the Mathematical Sciences Institute has the Department of Mathematics and the Centre for Mathematics and its Applications as its components, while the Department of Mathematics is also in the Faculty of Science. The Faculty of Science allocates and has responsibility for the budget in the Department of Mathematics. However, most decisions about the Department of Mathematics are joint ones to some extent. This has the advantage that staff can move between the Department and Centre over time, and be part of one ongoing research life of the Institute.

The key factor in the research success seems to be the closeness of the collaboration, rather than the structure under which it occurs.
ACADEMIC UNIT PROFILE

ASIA-PACIFIC SCHOOL OF ECONOMICS AND GOVERNMENT (APSEG)

Major Disciplines: Economics, Policy and Political Sciences, Asian-Pacific studies, Environmental Research.

RESEARCH

APSEG is a graduate professional school with a research base that brings disciplinary analysis to bear on major policy relevant topics confronting Australia, Asia and the Pacific. The research output of APSEG scholars can be best understood as being situated at the intersection of three broad intellectual currents. This encompasses disciplinary analysis coming primarily out of economics and political science; serious regionally oriented work out of the School's focus on Australia, Asia and the Pacific; and influential policy work. Put differently, without seeking simply to replicate the work of a pure disciplinary department, or a pure area-studies school, or a purpose-built think-tank, APSEG draws on the intellectual traditions of all three species. In broad terms, comparative analytics is a distinctive feature of much of APSEG's research output.

The focus on Australia and Asia is likely to be immediately understandable; Papua New Guinea and the island states of the Southwest Pacific, although very small, have come to assume high-profile policy importance in Australia in the context of new widespread security concerns about struggling and even failing states.

Highlights of APSEG's research profile that convey a sense of the spectrum of scholarly inquiry include:

- Key early work on the development of APEC and subsequently on regional trade in services, bilateral, regional and global trade policies and Asian financial integration.
- Leading research on Japanese economy, financial markets, trade, investment and growth; trade and economic reform in China and Vietnam; as well as fiscal arrangements in Papua New Guinea.
- Leading research on political institutions both in the context of developing democracies (especially Southeast Asia and the Southwest Pacific) as well as in Australia and other advanced industrial democracies.
- Leading work on the choice-modelling approach to environmental evaluation and the effects of different instruments for measuring and managing fishery stocks.
- Major studies and influential policy reports on economic reform, infrastructure and immigration in Australia.
- Theoretical innovations in modelling issues surrounding regulation and competition policy.

<table>
<thead>
<tr>
<th>Number of Academic Staff (FTE):</th>
<th>20.6</th>
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<tr>
<td>Number of General Staff:</td>
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<td>Number of Assessors:</td>
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External assessment

<table>
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<tr>
<th>% ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>23</td>
</tr>
</tbody>
</table>
**Prizes and Honours**
APSEG scholars attract a diverse array of honours. For example, Peter Drysdale has been awarded the Order of the Rising Sun and the Asia Pacific Prize of Japan and the Weary Dunlop Medal from Australia; Glenn Withers has served as Director of the peak Economic Policy Advisory Council; Jeff Bennett serves as President of the Australian Agricultural and Resource Economics Society; Richard Mulgan served on the Royal Commission into Electoral Reform in New Zealand and received the prize for best article two years running from the Australian Institute of Public Administration; Andrew MacIntyre has been short-listed for best article in comparative politics by the American Political Science Association; and Tom Kompas has received the Crawford Award for Excellence in Research from the Australian Bureau of Agricultural and Resource Economics.

**Education**
In 2004 APSEG has some 417 students studying in Canberra in degree programs. Of these, some 67 are working on their PhD dissertations.

Each of APSEG’s PhD scholars presents their own research profile through their home pages [APSEG PhD scholars](http://apseg.anu.edu.au/students/students_phd.php).
ACADEMIC UNIT PROFILE

CENTRE FOR ABORIGINAL ECONOMIC POLICY RESEARCH (CAEPR)

**Major Disciplines:** Economics, Policy and Political Science, Anthropology, Indigenous Studies.

**Other disciplines:** Environmental Research, Health Science

**RESEARCH**

The Centre for Aboriginal Economic Policy Research’s focus is on economic and social policy research designed to ensure better understandings of the socioeconomic circumstances of Indigenous Australians, in all their diversity, and on the development of policy approaches that might ensure improved socio-economic outcomes. CAEPR’s research combines academic excellence of the highest international standards with policy relevance, objectivity and realism. CAEPR is the only research centre in Australia that focuses on Indigenous economic policy and development issues. CAEPR was established in 1990 and since then has produced an unparalleled corpus of research of national significance that exceeds 800 publications. It has had a major impact on Indigenous policy research in Australia. CAEPR plans research in consultation with key stakeholders. As some of CAEPR’s operational support is provided by public sector agencies, it is required to provide a proportion of its research outputs in an extremely timely manner and increasingly in web-based readily available format.

CAEPR has a strong national focus. Links have been formed with research organisations, academics, and bureaucracies nationally and overseas, most notably in the United States, Canada and New Zealand where similar Indigenous policy issues are national priorities. For example, an important collaboration with staff at the University of Queensland and a group of renowned academic researchers from Canada, the United States of America and New Zealand in an edited volume Population Mobility and Indigenous Peoples in Australasia and North America published by Routledge, London in January 2004. A Memorandum of Understanding has recently been completed for research collaboration with colleagues undertaking the Harvard Project on Indian Governance at the University of Arizona in the USA.

**PRIZES, HONOURS AND AWARDS**

- Dr M. Brady, JG Crawford Medal for the best PhD thesis at ANU, 2000

**FELLOWSHIPS AND SENIOR APPOINTMENTS**

- Professor J.C. Altman, Fellow, Academy of the Social Sciences in Australia, 2003
- Professor J.C. Altman, Adjunct Professor, Charles Darwin University, 2001–
- Dr M. Brady, Member, National Expert Advisory Committee on Alcohol, 2002–
• Dr B. Hunter, Australian Census Analytical Program fellowship, Australian Bureau of Statistics, 2002–03
• Dr R.G. Schwab, Department of Education, Training and Youth Affairs Research Fellowship, 2000–01.

EDUCATION
The Director of CAEPR has only recruited graduate students since 2002. 5 students are currently at the Centre.

COMMENTARY
In a number of important respects the work of CAEPR differs from other Research Schools and Centres. First, an unusually high percentage of CAEPR research is applied and policy oriented. Second, much of its work is interdisciplinary in nature. And third, its charter is very specifically focused on Indigenous Australian issues, hence its ability to engage internationally is limited. Because of these factors it is difficult to glean a quantitative assessment of CAEPR, something noted by several assessors. It is clear from assessors comments that it is viewed as ‘invaluable’, ‘rather unique’, a ‘world leader’ and that it ‘stands alone in the world as the truly finest institution devoted to research on indigenous people’.
ACADEMIC UNIT PROFILE
CENTRE FOR CROSS CULTURAL RESEARCH (CCCR)


Other disciplines: Archaeology, Gender Studies, Law, Linguistics and Language Studies, Philosophy, Human Geography and Demography

RESEARCH
The CCR is dedicated to the enrichment of scholarly and public understandings of cross-cultural relations and histories. They have close links with the Humanities Research Centre (HRC), with whom they share accommodation. While the HRC supports short-term visiting fellowships, the CCR supports scholars on longer-term research fellowships. The HRC funds themed conferences whereas the CCR supports focused colloquia and workshops associated with Centre research projects. The Centre also undertakes many collaborative projects with major national cultural institutions. The Centre has a commitment to disseminating research in innovative formats and to training early career researchers. Consequently many researchers within the Centre are at postdoctoral level.

Research within the Centre is multidisciplinary and interdisciplinary within the following program areas:

- interrogating concepts of the cross-cultural;
- postcolonialism, history and memory;
- the cultural impact of migration to Australia;
- visual research, new media and technology across cultures; and
- cross-cultural perspectives on contemporary art and society.

Research outputs identified for this review fall within ten of the nominated disciplinary areas: History, Anthropology and gender Studies; Asian and Pacific Studies; Literature; Cultural Studies and the Arts; Indigenous Studies; Linguistics and Language Studies; Philosophy; Human geography and Demography; Law and Archaeology. In many instances it was difficult to decide on a discipline area – for example research in Indigenous art history could have been classified in at least three of the areas.

Also because research undertaken within CCR is multidisciplinary the quantity of outputs varies across the range of disciplines. For example the CCR has (or has recently has) only one junior researcher working in each of the disciplines of Linguistics, Philosophy, and Archaeology but has significant clusters of researchers in the disciplines of History, Indigenous Studies, Anthropology and Gender Studies and Literature, Cultural Studies and the Arts.

| Number of Academic Staff (FTE): | 19 |
| Number of General Staff: | 8.4 |
| Number of Students (EFTSU): | 27 |
| Higher Degree Research: | 100% |
| Higher Degree Coursework: | 0% |
| Number of pieces of work submitted for assessment: | 288 |
| Number of Assessors: | 46 |
| Number of staff with work submitted: This # includes fractional and adjunct appointments and all grades of academic staff | 30 |
| External assessment | | |
| % ANU in Top 25% | 74 |
| % ANU in Top 5% | 32 |
PRIZES, HONOURS AND AWARDS
In the period 1997 – 2003 staff at the CCR have been awarded the following:

- Professor Iain McCalman, 2003 Canberra Critics Award for Literature; 2002 British Academy Centenary Medal, 2002 Federation Centenary Medal
- Professor Tim Bonyhady, 2001 NSW Premier’s Australian History Prize and The Queensland Premier’s Prize for his book *The Colonial Earth*
- Dr Sylvia Kleinert (with Margo Neale), 2001 Australia and New Zealand Art History Association’s prize for Book of the Year for *The Oxford Companion to Aboriginal Art and Culture*
- Mr David MacDougall and Ms Judith MacDougall, honoured filmmakers at the 2001 Freiburger Film Forum in Germany
- Dr Jacqueline Lo, 2001 Australian Drama Studies Association Marlis Tiersch essay prize for ‘Beyond happy hybridity’
- Professor Ann McGrath, 2002 National Trust Heritage Award for the exhibition *Births of a Nation*
- Professor Dipesh Chakrabarty, named the Lawrence A Kimpton Distinguished Services Professor, University of Chicago, 2003
- Ms Betty Churcher. Chair, ACT Committee for the Centenary of Federation; member Federal Council for the Centenary of Federation; and Chair of its Events and Celebrations Committee

EDUCATION
Total research student load 2001-2003 2001 was the first year students were formally located within the Centre. As enrolments commenced in 2001, the first completions will not occur until 2004. Currently there are 19 graduate students at the Centre.
ACADEMIC UNIT PROFILE

CENTRE FOR MENTAL HEALTH RESEARCH (CMHR)

Major Disciplines: Cognitive Ageing, Psychiatry, Mental Health and Clinical Psychology.

Other disciplines: Mathematics

RESEARCH

The Centre consists of 12 full academics (Level A and above), 18 research and administrative staff, 11 PhD students, a number of visiting fellows and 12 part-time interviewers. The Centre has two primary research foci (a) longitudinal research studies of risk factors and determinants of common mental disorders, in particular depression, anxiety, substance misuse, and cognitive decline and dementia; and (b) public health interventions to prevent common mental disorders and to improve the public’s mental health literacy. The Centre also has three research units which cut across these broad foci: Ageing Research Unit, Depression & Anxiety Consumer Research Unit, and Family & Community Health Research Unit.

EDUCATION

The Centre currently has 11 research students.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
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</thead>
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<tr>
<td>Number of Academic Staff (FTE)</td>
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<tr>
<td>Number of General Staff</td>
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<tr>
<td>Number of Students (EFTSU)</td>
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<td>Higher Degree Research</td>
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<td>Higher Degree Coursework</td>
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<tr>
<td>Undergraduate</td>
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<td>Number of pieces of work submitted for assessment</td>
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<td>Number of Assessors</td>
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</thead>
<tbody>
<tr>
<td></td>
<td>71</td>
<td>33</td>
</tr>
</tbody>
</table>
ACADEMIC UNIT PROFILE

HUMANITIES RESEARCH CENTRE (HRC)

Major Disciplines: History, Literature, Culture and Arts Criticism; Asian and Pacific Studies.

Other disciplines: Demography and Human Geography; Economics; Environmental Research; Law; Philosophy; Political Sciences; Anthropology and Gender Studies, and Archaeology

RESEARCH
The HRC acts as a focus of local, national, and international research, organizing most of its activities in relation to major interdisciplinary themes, which change annually. During the period of the present Review the themes have been: Africa (1995), Science and Culture (1996), Identities (1997), Home and Away: Journeys, Migrations, Diasporas (1998), Religion, Society, and Values (1999), Law and Humanities (2000), Enlightenment (2001), Latin America (2002), and Culture, Environment, and Human Rights (2003).

Since the creation in 1997 of the ANU’s Centre for Cross-Cultural Research as an ARC Special Research Centre, the HRC and CCR have worked in close and productive collaboration. At present they share accommodation and a journal (Humanities Research) and together support a number of activities and researchers. While maintaining their distinct missions and identities, the two Centres have also developed a strongly synergetic relationship. The HRC serves as the headquarters for a consortium of Australian humanities centres, and has developed a strong working relationship with national cultural institutions in Australia and specific centres and institutes in the United Kingdom, United States and Asia.

As the listing of annual themes above will suggest, the HRC interprets ‘the humanities’ with a measure of flexibility. The traditional territory of research in the humanities – classics, literature, history, philosophy, musicology, art history, etc.—has always been well supported by the HRC, which also however seeks to encourage interest in new methodologies and new areas of study, such as cultural studies. The Centre maintains a strong but selective interest in areas of law and the social sciences, and makes occasional raids into the natural sciences.

THE NATIONAL EUROPE CENTRE
Also within the umbrella of the HRC is the National Europe Centre. Established in 2001, with seed funding from the European Commission and The Australian National University, the Centre provides a focus for research on Europe within the University and Australia more generally. The National Europe Centre is a distinctive interdisciplinary institution that has extensive links to the international and diplomatic communities, and supports a diverse program of scholarly and outreach activities that focus on the European Union and bilateral relations between Australian and Europe.
PRIZES, HONOURS AND AWARDS
- Professor Iain McCalman, Canberra Critics Award for Literature, 2003
- Professor Iain McCalman, awarded British Academy Centenary Medal, 2002
- Professor Iain McCalman, awarded Federation Centenary Medal, 2002
- Professor Tim Bonyhady, awarded the 2001 Queensland Premier’s Prize for History and the NSW Premier’s Prize for Australian History for his book *The Colonial Earth*
- Professor Bill Gammage, awarded the Inaugural Queensland Premier’s Prize for Non Fiction 1999 for his book *The Sky Travellers: Journeys in New Guinea 1938-1939*

FELLOWSHIPS AND SENIOR APPOINTMENTS
- Researchers in the Humanities Research Centre possess the following fellowships:
  - Eight Fellows of the Australian Academy of the Humanities (Professor Iain McCalman, President, 2001-2004)
  - Two Fellows of the Australian Academy of the Social Sciences
  - One Fellow of the British Academy since 1987
  - One Fellow of the Royal Society of Edinburgh since 1993
  - Professor McCalman, member, National Library of Australia Council
  - Professor McCalman, member, Australian Research Information Infrastructure Committee (2003)
  - Mrs Betty Churcher, Deputy Chair, Australia-India Council
  - Dr Caroline Turner, Fellow, Royal Society of Arts, London
  - Dr Caroline Turner, member, Board of the Cultural Facilities Corporation of the ACT Government, 2003 –
  - Dr Caroline Turner, member, Australia-Indonesia Institute (Australian Government Appointment), 1995-1998
  - Dr Caroline Turner, member, Australia Abroad Council, (Australian Government Appointment), 1995-1996
  - Ms Bernice Murphy, Vice-president, International Council of Museums, Paris, Maison de l’Unesco
  - Ms Bernice Murphy, member of board, Museum Domain Management Association, joint initiative of ICOM (Paris) and the J. Paul Getty Museum & Institute (Los Angeles)
  - Professor Amareswar Galla, President, International Council of Museums (ICOM), Asia-Pacific Chapter

EDUCATION
The HRC commenced its formal PhD Research Program in 2001, and now has 8 candidates. The first completions are expected to occur in 2004.

COMMENTARY
In one important regard the work of the HRC differs from that of many Research Schools. So far from supporting a set of clearly discrete and at times mutually incomprehensible sub-disciplines, the HRC seeks to encourage researchers from a variety of disciplines within the humanities to join in shared conversations and collaborative projects in a manner not always easily attained within the highly specialized structures of modern universities. An unusually high percentage of HRC research is therefore interdisciplinary in nature. The overall achievements of the Centre might thus be seen as something more than a simple sum of its disciplinary parts.
The table of disciplines shown above does not accurately represent the range of HRC research activity, for the work of its short-term Visiting Fellows has been excluded from the data collected for this Review. Thus the HRC’s commitment to Asian Pacific studies (for example) may seem slight, to judge by the number of publications listed here. But the HRC’s annual theme for 2004 is ‘Asia-Pacific’, and the Centre is currently supporting thirty-six Visiting Fellows (most of whom work in this general field) and ten conferences with an Asian-Pacific theme. Similar examples could be cited in relation to other disciplinary areas.
ACADEMIC UNIT PROFILE

MATHEMATICAL SCIENCES INSTITUTE (MSI)

Major Disciplines: Mathematics, Physics
Other disciplines: Information Science

RESEARCH
The Mathematical Sciences Institute has three Academic Organisational Units. These are the Department of Mathematics (DoM), the Centre for Mathematics and its Applications (Institute) and the Centre for Mathematics and its Applications (Faculties). The DoM, is also a Department in the Faculty of Science and its staff are responsible for the teaching of mathematics courses at the ANU. The Centre for Mathematics and its Applications (CMA) is an international research centre with some overall similarities to the Max Planck Institute for Mathematics in Bonn.

The staff of both the DoM and the CMA are integrated into the following research programs or subdisciplines: Applied and Nonlinear Analysis and Geometry; Statistical Science; Stochastic Analysis; Algebra and Topology; Advanced Computation and Modelling; Astronomy and Astrophysics; Mathematical Physics.

PRIZES, HONOURS AND AWARDS
The MSI as a whole compares very favourably with similar Institutes worldwide, especially when its modest size is taken into account. Its staff include three Fellows of the Royal Society, this being all Fellows in the mathematical sciences residing in Australia, eight Fellows of the Australian Academy of Science and nearly half of all the winners of the Medal of the Australian Mathematical Society (in fact four in the last six years). Moreover members of MSI hold visiting positions at leading institutions overseas, are active in heading programs at major research institutes or as plenary speakers to major conferences (for example over the last two International Congresses of Mathematicians there have been five MSI staff involved as sectional speakers or in the organisation).

MSI staff are recipients of international prizes and have from time to time been offered positions at the world’s major universities (indeed the MSI has lost several staff to those institutions in the past).

BIBLIOMETRIC ANALYSIS

<table>
<thead>
<tr>
<th>Discipline</th>
<th>No of Pubs</th>
<th>Citations Per Publication</th>
<th>Impact relative to World</th>
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<tbody>
<tr>
<td>Mathematical Sciences</td>
<td>250</td>
<td>1.59</td>
<td>1.15</td>
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</table>
EDUCATION

Undergraduate
The Department of Mathematics offers a wide range of courses and programs, catering to students who wish to study the subject for its own interest, its applications, or a mixture of both:

- **Fundamental (or Theoretical) Mathematics** for those with a significant interest in the subject in its own right, either from a vocational standpoint or because of its intrinsic interest.
- **Cross Disciplinary Mathematics** (Contemporary Applied Mathematics). This is an excellent way to acquire mathematical skills together with a broad knowledge of one or more major areas of contemporary science and technology, including bioinformatics (human genome project), computational science (information technology), astrophysics, and other modern applied mathematics.
- **Complementary Programs** for those whose major interest is in another area (e.g., biology, chemistry, computing, economics, engineering, geography, information technology, physics, statistics) for which they need to make use of mathematical tools and techniques at a range of different levels.

Students undertaking a combined Science degree can still obtain a good knowledge of more than one area of contemporary science by studying cross disciplinary and fundamental mathematics courses as the major part of their Science degree.

Postgraduate
Postgraduate supervision for the Master’s degree and for the degree of Doctor of Philosophy is available in several areas. Graduate Diploma programs in Mathematics and in Scientific Computation are available, and may be used as a bridge between the Pass degree and the Master’s and PhD degrees.

Graduate Students: CMA (incl. CbiS): 19 DoM: 5

COMMENTARY
MSI is represented in four discipline groups:

- **Mathematical Sciences**. This is by far our largest discipline by faculty numbers. We obtained strong ratings overall but interestingly the best were in the subdisciplines with fewer retired or young researchers contributing. Nevertheless the younger staff did get commendations.
- **MSI** is part of a collaborative team (joint with RSPhysSE) in statistical mechanics and integrable models in the Physical Sciences discipline. The team received outstanding assessor comments.
- **MSI** has a small specialised group in theoretical astrophysics which is crossdisciplinary in that it has a focus on computational methods.
- **There is an MSI group** in the Informational Sciences and Engineering discipline which works in advanced computation and modelling.

Overall the assessor ratings were in line with our own judgements of our strengths and consistent with our development plans.
ACADEMIC UNIT PROFILE

NATIONAL CENTRE FOR EPIDEMIOLOGY AND POPULATION HEALTH (NCEPH)

**Major Disciplines:** Epidemiology, Health Sciences, Demography and Sociology, Mathematics (Statistics)

**Other disciplines:** Cultural Studies, Indigenous Studies

**RESEARCH**

NCEPH’s five core research disciplines are epidemiology, biostatistics, sociology, demography and health economics. Since 2001, the research program has been organized around five substantive topic areas: environmental health; social determinants of health; transmission and control of communicable diseases; population, health and development; and health systems. People and ideas flow between the five disciplines and five topic areas. In particular, over the past two years, there has been much disciplinary interaction in research on social, cultural and environmental influences on the rise of obesity in Australia; on relationships between urban development, environment and health; on the health transition process in Thailand; and in studying how working conditions affect family health.

To meet the growing interest internationally, nationally and within NCEPH in undertaking research that is integrated across disciplines and which can influence policy and practice, Bammer and colleagues are developing a research program examining the theory and methods of integration and implementation. Beyond its more general applications, this work is specifically being incorporated into two projects – one on better integration of treatment, prevention and law enforcement in responding to illicit drugs, and another examining the effectiveness of cross-disciplinary and cross-sectoral collaboration in the Australian Research Alliance for Children and Youth (ARACY).

Bammer is coordinating the international Integration and Implementation Sciences Network. NCEPH also has a strong track record in timely responses to important issues of the day, including clarifying the relationship between deep vein thrombosis and airline travel, lung cancer mortality prediction using multi-state population smoking models, and collaboration in international research into the health risks due to hormone replacement therapy.

Much of the Centre-wide research has external indicators of high quality. These include: (a) major international and national funding sources, (b) major awards to a number of the investigators, (c) invitations to participate in and speak at international and national fora.

NCEPH’s capacity to undertake interdisciplinary research has been recognised in its success winning research grants. Some of these have their “home base” in particular Research Groups. Examples are: the NHMRC Capacity Building Program grant; the project grant on work, family and health; and the Thai Cohort Study. NCEPH has been sought out as a

| Number of Academic Staff (FTE): | 32.9 |
| Number of General Staff: | 17.6 |
| Number of Students (EFTSU): | 46 |
| Higher Degree Research: | 54% |
| Higher Degree Coursework: | 46% |
| Undergraduate: | 0% |

| Number of pieces of work submitted for assessment: | 244 |
| Number of Assessors: | 34 |
| Number of staff with work submitted: **This number includes fractional and adjunct appointments and all grades of academic staff.** | 41 |

<table>
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<th>% ANU in Top 25%</th>
<th>% ANU in Top 5%</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>53</td>
<td>17</td>
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</table>
research leader in the current initiative to win 7-year funding for research on urbanism, environment and health (McMichael is chairing the steering committee).

**Other Indicators**
- Bammer was awarded the only Australian place on the inaugural Fulbright New Century Scholars Program, 2001-2, and has been a Research Fellow at the Hauser Center for Nonprofit Organizations, Harvard University, since 2002. She has won two awards supporting her work on research integration – a Fulbright Institutional Partnership Grant (2003, administered through Harvard University) and part of a $1.4 million dollar award from Colonial Foundation to Turning Point Alcohol and Drug Centre. Bammer is also the only international member of a US National Cancer Institute project on the “Study and Implementation of Systems”, taking an integrated approach to tobacco control.
- Van Kerkhoff, pursuing this same line of research, has a 12 month appointment to the Center for International Development, Harvard University, starting in late 2004. She has been awarded a Fulbright Postdoctoral Fellowship and a Land and Water Australia Travelling Fellowship.
- R Woodruff: international prize-winning paper, on climatic influences on Ross River virus disease.
- McMichael was senior editor for "Climate Change and Human Health: Risks and Responses": 12-chapter book published by three UN agencies in late 2003.
- McMichael represented Australian science at planning of fourth cycle of UN's Intergovernmental Panel on Climate Change, Potsdam, Germany, September 2003; and member of International Task Force on Climate Change (advising the UK Government).

**Education**
The Master of Applied Epidemiology (MAE) program remains a unique national resource, training work-ready public health practitioners in Australia and the region. The MAE continues to attract many more applicants than it can accept, and receives widespread commendation and requests for expertise. In 2003, over 20 MAE staff and graduates were intensively involved in the national and international response to the Asia-Pacific SARS crisis.

**Commentary**
Because of the disparate set of contributory sources to this category, it is difficult to glean a quantitative assessment of NCEPH (the major contributor: 53% of all publications in category). However, it seems clear from Assessors’ Comments 1-4 that the overall assessment of NCEPH was extremely positive: e.g., “impressed by”, “leading edge”, “high standards”, “strong collaborations”, “dynamic research culture”, and “national leader and has well established international credentials.”
ACADEMIC UNIT PROFILE

NATIONAL GRADUATE SCHOOL OF MANAGEMENT (NGSM)

Major Disciplines: Business and Commerce, Economics.

Other disciplines: Psychology

RESEARCH
Research was not a major focus of the school during its first ten years. However, since the beginning of 2003, there has been a focus on the research profile and reputation. This shift is already starting to bear fruit with dramatic increases in the number of PhD students, journal publications (particularly in Financial Times 40 ranked journals) and applications for grants.

The research work of the NGSM is largely centred on individuals and small collaborative teams rather than disciplinary areas. There is an increase in cross-disciplinary collaborations between academics through supervisory panels and collaborative grant applications.

The Innovation Management and Policy Program was launched in 2001 with a view to:

a) Building on NGSM capacities and interest in innovation, both corporate management and public policy issues;
b) Contributing to the strengthening of capacities for commercialisation in the ANU; and
c) Exploring the scope for greater interaction among areas in the ANU and working in areas related to science and innovation policy. The IMPP aims to develop a self-funded program based on a portfolio of activities: Research, Consulting, Training and Teaching.

The major research activity of the IMPP is a 3 year ARC Linkage project involving five partners: the CSIRO, Department of Industry, Trade and Resources; National Office for the Information Economy, Department of Agriculture, Fisheries and Forestry and the Australian Business Foundation.

EDUCATION
The NGSM opened in 1993 and was initially focused on the development of excellent teaching using local and international networked faculty mainly for full fee-paying international postgraduate students. The School now has approximately 350 postgraduate students undertaking a range of programs including the Master of Business Administration, Master of Management, Master of Management Technology and the Master of International Management (in English and Mandarin, locally and offshore). There is a strong focus on professional education in management in Asia, particularly China. The curriculum and student mix have emphasised cross-cultural and international business.
The NGSM has had a small number of PhD students since 1997 and dramatic growth since 2003.

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</table>
ACADEMIC UNIT PROFILE

ANU SUPERCOMPUTER FACILITY (ANUSF)

Major Disciplines: Chemistry

Other disciplines: Physical Sciences, Engineering, Mathematics

RESEARCH
The ANU Supercomputer Facility is part of the Division of Information at the ANU. As such, ANUSF is primarily a service unit. However, a substantial proportion of the staff have a research and academic background and are engaged part-time in research work, usually in collaboration with researchers elsewhere in the University and beyond. ANUSF takes responsibility for providing the platforms and high-level research support for what has been termed e-Research, i.e. the application of advanced information technologies in support of research, largely in the scientific area, but increasingly expanding into the humanities and social sciences.

The formal role of the Facility is to:

- Plan, develop and maintain high performance computer systems and services in support of researchers (and to a lesser extent education programs);
- Assist researchers in taking maximum advantage of the systems by providing high level advice on optimization, data management and algorithm development and choice; and
- Play a leading role in developing University and national infrastructure in e-science and e-humanities.

A major focus of ANUSF over recent years has been the support of the National Facility of the Australian Partnership for Advanced Computing (APAC), the Federal government’s national high performance computing program. The National Facility has almost 800 users around the country. Researchers at other Australian universities as well as the CSIRO are supported in a similar manner to those at the ANU.

EDUCATION
Not being an Academic unit, ANUSF has no research students. However, staff have been formal co-supervisors of at least two PhD students and supervisors of a large number of Honours undergraduate students in 1999-2003.

| Number of pieces of work submitted for assessment: | 45 |
| Number of Assessors: | 9 |
| Number of staff with work submitted: | 13 |

<table>
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<td>% ANU in Top 25%</td>
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<td>% ANU in Top 5%</td>
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RESEARCH ASSESSMENT
BY FIELD
RESEARCH ASSESSMENT
ASIAN AND PACIFIC STUDIES
RFCD code: various

Major Contributors: Faculty of Arts, Faculty of Asian Studies, Research School of Pacific and Asian Studies (RSPAS), Asia-Pacific School of Economics and Government (APSEG), Centre for Cross Cultural Research (CCCR).

Smaller Contributors: Faculty of Law, Humanities Research Centre (HRC).

The major contributors conduct research specifically related to the Asia-Pacific region in the fields of Linguistics, Sociology, Culture, Religious Studies, Literature, Gender, Economics, History, Archaeology and Politics. RSPAS has by far the largest number of research outputs in this field of study, and together with the Faculty of Asian Studies covers all of the above categories extensively.

BIBLIOMETRIC ANALYSIS
As in most social science and humanities disciplines, journals are not the most common mode for reporting Asian and Pacific studies research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 13% of RSSS output appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

COMMENTARY
In general, research at the ANU on the Asia-Pacific region draws strongly on disciplinary traditions at the same time as speaking to a diverse range of important social, cultural and policy issues.

International assessors from diverse disciplines have commented that they look to ANU research as a reliable source of knowledge from the Asia-Pacific region. In a broad sense, then, much of the ANU’s research is in an Asian-Pacific context.

All research submitted to the Asian and Pacific Studies panel has been evaluated in addition by assessors in its relevant discipline – thus, the research items selected for assessment in Asian economics was evaluated by both the interdisciplinary panel for Asian and Pacific Studies, and by the Economics panel.

Several assessors highlighted the strength of the collaborative, multi-disciplinary and interdisciplinary approach to the study of Asian and the Pacific taken at the ANU.
Major Contributors: Research School of Astronomy and Astrophysics (RSAA).

Smaller Contributors: Mathematical Sciences Institute (MSI) and Faculty of Science.

Astronomy at the ANU is conducted by the Research School of Astronomy and Astrophysics, centred around the historically significant Mount Stromlo observatory. Researchers from the RSAA also contribute the bulk of the astrophysics publications, with some contribution coming from the Mathematical Sciences Institute and the Department of Physics in the Faculty of Science.

There are around 25 PhD students engaged in research training at RSAA at any one time. The Faculty of Science offers an undergraduate program in astrophysics.

BIBLIOMETRIC ANALYSIS

Nearly all the reported publication output for the RSAA is in ISI indexed journals (95%). Australia's citation performance in the discipline is very strong, and ANU is one of the major drivers of this result. It accounts for over one-quarter of all publications in astronomy in the country.

ANU's citation rate (14.30) is over double the world average (6.73). Its publications appear primarily in journals in the top impact quartile, and even for this high impact set it achieves citation levels significantly above the expected level.

Astronomy publications come primarily from the Research School and Astronomy and Astrophysics. 37 publications list the virtual centre, Astrophysical Theory Centre (ATC), in their address by-line without specifying which area they are associated with.
While always well above Australian and world benchmarks, the ANU’s citation rate has seen a dramatic increase in the latter half of the 1990s. It is therefore not surprising to see that over half Australia’s most highly cited publications in the discipline are from the ANU.

**COMMENTARY**
The numerical assessment of the astronomical research at the ANU was above the University average in terms of the percentage of research that is world-class, and was significantly so in that nearly 40% of the research was judged to be of exceptional significance. However, even these figures fail to capture the level of esteem held by assessors for the research in astronomy emanating from the ANU as expressed in assessors’ qualitative commentary.

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<td>EFTSU:</td>
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</table>
Major Contributors: Centre for Aboriginal Economic Policy Research (CAEPR), Centre for Cross Cultural Research (CCCR), Faculty of Arts, Research School of Social Sciences (RSSS).

Smaller Contributors: Research School of Pacific and Asian Studies (RSPAS), National Centre for Epidemiology and Population Health (NCEPH).

CAEPR has an excellent record of Economic and Policy research in the field of Indigenous Studies. The Centre has also conducted research in the fields of Political Science, Demography and Anthropology. The other major contributors to this field, CCCR, RSSS and the Faculty of Arts, have concentrated their Indigenous Studies research mainly but not exclusively in the sub-field of Aboriginal Languages, Cultures, Arts and Histories. The Faculty of Arts has also made a large contribution to Indigenous sociological, demographic and anthropological research at the ANU.

BIBLIOMETRIC ANALYSIS
As in most social science and humanities disciplines, journals are not the most common mode for reporting indigenous studies research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 21% of RSSS output, and just 6% of Faculty of Arts output, appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

COMMENTARY
A number of assessors note that the highly specific, culturally and nationally focused nature of the research in this area makes it difficult to assess according to international standards. Nevertheless theoretical and applied research in this area is frequently referred to as being at 'world best practice' standards despite its uniqueness. What is more some assessors highlight that international collaborations and partnerships are allowing ANU to export guidance and leadership to enhance research performance by similar research centres in the USA, Canada and New Zealand.

| Number of pieces of work available for assessment: | 216 |
| Number of Assessors: | 6 |
| Number of staff with work submitted: | 76 |
| IAS | 7 |
| Faculties: | 21 |
| Centres | 48 |
| Number of Higher Degree research students (2004) | 3 * |
| EFTSU: | |

* see also specific disciplines
RESEARCH ASSESSMENT
BIOLOGICAL SCIENCES
RFCD code: 27

**Major Contributions:** Faculty of Science, Research School of Biological Sciences (RSBS)

**Smaller Contributors:** Centre for Resource and Environment Studies (CRES), Faculty of Arts, John Curtin School of Medical Research (JCSMR)

The single largest contributor to this field is the School of Botany and Zoology at the Faculty of Science, with almost 150 research works submitted for review in this field. The primary research speciality of the School of Botany and Zoology is the ecology, evolution and systematics of the Australian terrestrial biota. This research is conducted while maintaining an extensive undergraduate teaching programme.

Plant Science research at the Faculty of Science is conducted at The School of Biochemistry and Molecular Biology (BaMBi), in programs in Infection and Immunity, Membrane Biology, Parasitology and Plant Science and Biotechnology; and at the School of Botany and Zoology, in programs in the ecology, evolution and systematics of the Australian terrestrial biota. In addition to some stellar research, the both Schools manage excellent undergraduate teaching programmes.

At the Research School of Biological Sciences RSBS, research is distributed across the range of study in this field, and covers Genetics and Gene Regulation (their most prolific area), Ecology, Evolution, Zoology and Animal Physiology.

At RSBS research programs in plant sciences range from ecology and global change biology, to environmental physiology, developmental cell biology, photobioenergetics and proteomics, and include the ARC Centre for Integrative Legume Research, and the Cooperative Research Centre for Greenhouse Accounting. Members are also involved in the CRC for Tropical Plant Protection and the CRC for Sustainable Rice Production.

### Quality of research:

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<th>Internationally excellent (World's top 25%)</th>
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Assessors Rating of ANU in the field
**Bibliometric Analysis**

**Genes, Ecology and Evolution**

The analysis in this section is restricted to the journal set that aligns with the RFCD discipline, ecology and evolution. It is therefore not an exact match to the makeup of this field.

While a significant proportion of publications in the biological sciences are to be found in non-journal outlets, ISI indexed journals are the main media for research dissemination; e.g. 70% of RSBS output for 1999-2001 appeared in ISI indexed journals.

The strength of the ANU's citation performance in this discipline can be seen in all the performance measures. Its citation rate is well above that for any other Australian university, and is over 60% above the world level. It has many publications in the most highly cited clusters of Australian publications, and very little of its output is placed in journals classified to the bottom impact quartile. The ANU's actual citation count is well above the expected level for its high impact journal set.

All ANU areas publishing in the Ecology and Evolution journal set that can be separately analysed have very strong citation performances, with citation rates well above world and Australian averages.

After a fall in citation rates in the late 1980s, the ANU's rate has almost trebled in the last decade and now stands to be well above the world.

**Plant Sciences**

The analysis for this field was undertaken using the ISI journal set 'Plant Sciences'. While a significant proportion of publications in the biological sciences are to be found in non-journal outlets, ISI indexed journals are the main media for research dissemination; e.g. 70% of RSBS output for 1999-2001 appeared in ISI indexed journals.

The ANU's strong citation performance in plant sciences can be deduced from its high citation rate (over 70% above the world level), its strong presence in Australia's most highly cited set of publications, and the fact that over half its publications in the discipline appear in journals classified to the top impact quartile. In addition, the ANU attracts citations at a greater rate than expected for its high impact journal set.
**COMMENTARY**

Research in Plant Science in the Faculty of Science is particularly strong and highly rated in spite of the large undergraduate teaching loads of the staff. This is mentioned by the comments of multiple assessors. It is split between the School of Biochemistry and Molecular Biology and the School of Botany and Zoology. Both have had very large increases in undergraduate and research higher degree numbers over the last few years. Bibliographic analysis highlights the citations rates that are well above the average.

There are 5 “highly cited researchers” from RSBS in the Thompson-ISI Plant and Animal Science category, from a world list of 254 of whom another 9 Australians are outside the ANU. Some of the spread of work is shown in individual papers hyper-linked to the groups above (one paper with brief commentary per person) The RSBS Plant scientists collaborate closely with plant scientists from the Faculties, in Biochemistry and Molecular Biology and Botany and Zoology.

Plant Science has been a major focus of RSBS from its foundation, and its research achievements have been highly distinguished, highly cited and internationally recognised.

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RESEARCH ASSESSMENT

BIOMEDICAL RESEARCH

RFCD code: 32 (not 321021; 321204)

Major Contributors: John Curtin School of Medical Research (JCSMR), Faculty of Science, Research School of Biological Sciences (RSBS)

Smaller contributors: Research School of Physical Science and Engineering (RSPhysSE), and National Centre for Epidemiology and Population Health (NCEPH)

At JCSMR, The Division of Molecular Bioscience has a broad focus with the general aim of understanding the molecular mechanisms governing the function of cells and applying this information to the aberrant molecular events that lead to disease. Areas of research within the Division relate to many diseases such as diabetes, asthma, allergy, cancer and viral diseases. Research in immunology and microbiology is another major focus of the JCSMR overall work in the biomedical sciences.

The Division of Neuroscience consists of 10 research groups, made up of 22 academic staff. The central core of Neuroscience research is synaptic transmission and neuronal signalling in the brain and spinal cord. Research groups in the Division of Neuroscience have recently won large grants from important international funding bodies, and have the latest technologies for electrophysiology and imaging at the single cell level.

The JCSMR conducts research in Medical Physiology, and also conducts research in Clinical Medicine, including treatment of allergies, and the treatments for AIDS and the management of HIV. RSBS has four laboratories studying medical physiology - the determination of eye size, myopia; normal and abnormal sensory processing in human brain; stability of central nervous systems including human brain and Alzheimer’s disease; and development and stability of human retina and the disease macular degeneration.

At the Faculty of Science, The School of Biochemistry and Molecular Biology (BaMBi) is part of the Faculty of Science at the ANU, with two Academic Staff members belonging to the newly-established Faculty of Medicine (distinct from JCSMR). The School has responsibility for teaching all aspects of cell and molecular biology at an undergraduate and postgraduate level, and the research interests of the staff also fall within this area. There are several research groups in the School of Biochemistry and Molecular Biology in the Faculty of Science which work in the areas of immunology and parasitology, some in collaboration with JCSMR.

At RSBS, research in biochemistry and molecular genetics is undertaken in two of RSBS’ Research Groups, and their research fall naturally into 2 sub-fields: Genetics and Molecular Genetics. Vision research is a leading specialization. The Visual Sciences Group developed from a strong tradition of research in invertebrate vision, to which has been added over the past decade a strong stream dealing with vertebrate vision. All the research teams in the Visual Sciences Group have significant national and international profiles. A very recent addition is a group (CNS Stability and Degeneration) with a strong focus and international profile in the cell biology and degenerative diseases of the central nervous system, with a particular emphasis on the retina.

The Biophysics Group in the Department of Theoretical Physics in RSPhysSE, formerly the Protein Dynamics Unit in the Faculty of Science, is funded by the National Health and Medical Research Council and the Australian Research Council.

Chapter 2: The Quality of Research 109
BIBLIOMETRIC ANALYSIS

The bibliometric analysis for this field encompassed the disciplines of biochemistry and cell biology, and genetics. Research in these disciplines is primarily published in the ISI journal literature.

A number of areas in ANU contribute to its output in these disciplines. To a large extent, their citation rates are a reflection of the focus of their research. Even within a single discipline in the biological sciences, research with a human focus (JCSMR) will have a higher citation rate than research with a plant or animal focus (RSBS and Fac Sci).

JCSMR exhibits a strong performance — above world citation rates in relatively high impact journals — in a group of disciplines which are not among Australia’s strengths. The Faculty of Science achieves citation rates well above the expected level for the journals in which it publishes.

The impact of RSBS’s journal set and its citation rate are very close to the world level. Australia’s average citation rate in these high impact disciplines of the biological sciences fell below the world level in the early 1990s and has remained there for the rest of the period covered by the analysis. By contrast, the ANU’s citation rate has nearly doubled in the last decade, and is now almost at the world level.

COMMENTARY

Immunology

This is an important discipline at ANU, the analysis of the immune response to infectious diseases in the John Curtin School of Medical Research represents a continuation of the seminal studies by Fenner then Doherty and Zinkernagel. Unfortunately, the assessment is problematic.

Only two assessors returned their evaluations of this discipline. One provided numerical ratings just a little lower than the average for the ANU as a whole; the brief comments from this assessor were positive and are reproduced above.

The assessor observes that he has adjusted his assessment because some of the research submitted was conducted before the researchers had joined the ANU. However, the purpose of this exercise in part is to assess current research capability and thus the institution’s ability to attract new staff with strong research records.

The other assessor provided no comments to support his extremely low numerical ratings, which at face value place the ANU in mid-field as compared with all other universities.
internationally. As something of a contradiction, he also indicated that the ANU was among the world’s top 25 universities in the fields of immunology and microbiology.

It is also not supported by the bibliometric analysis. For the most recent period, 1998-2002, the ANU has a citation rate 30% above the world average. The ANU’s publications appear almost exclusively in journals in the top two impact quartiles. While it publishes in a very high impact journal set, it falls short of the expected citation level for these journals. The analysis of ANU immunology is based on a relatively small set of publications, so the volatility of citation rates exhibited across time are not unexpected.

Neuroscience
The sub-discipline of Neuroscience, included in this discipline, gained the highest assessors’ rating of any of the scientific sub disciplines (only Philosophy was rated better). This reflects the standard of the Neuroscience Division at JCSMR, the two Neuroscience groups at RSBS (Visual Sciences and CNS Stability and Degeneration) and smaller but high quality groups in other Centres.

Infection and immunity
A significant proportion of the Faculty of Science’s research in the field of Biological and Biomedical Sciences falls in the area of Infection and Immunity and the problems alluded to above with regard to assessment in this area will therefore impact on the Faculty’s overall performance in this field. It is important to note that there were only two assessors in the field of infection and immunity, and that their opinions differed widely. Furthermore, the opinion of the assessor with a lower assessment of the work was based on a small sample of the output. There is therefore considerable uncertainty in this assessment – this uncertainty could be quantified to some extent but has not been. The assessment has, however, been weighted on the same basis as the opinions of the larger number of assessors in other areas.
RESEARCH ASSESSMENT

BUSINESS AND COMMERCE

RFCD code: 35

Major Contributors: Faculty of Economics and Commerce (FEC)

Smaller Contributors: National Graduate School of Management (NGSM), Faculty of Engineering and IT (FEIT).

FEC research covers the range of study in this discipline, including Management, International Business, Marketing, Finance, Accounting and Auditing, and Information Systems. NGSM covers most of these areas, on a slightly smaller scale, but generally does not undertake Accounting and Auditing research.

At FEC, Accounting research is undertaken at the School of Business and Information Management. The three key research areas for the group are: (1) auditing; (2) environmental reporting; and (3) public sector accounting. The principal vehicle for auditing research is The Australian National Centre for Audit and Assurance Research, which provides mechanisms for collaborative work with industry and other auditing researchers around the world.

There is a research active group within the faculty that forms the nucleus of the National Centre for Information Systems Research (NCISR). Since its formation in 2004 it has won more than $250,000 in cross-discipline research grants.

**BIBLIOMETRIC ANALYSIS**

Journals are not the most common mode for reporting business and commerce research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 22% of Faculty of Commerce and Economics output appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

**COMMENTARY**

The issue of the relative difficulty in matching the critical mass of US research in this discipline was raised by several assessors. There is no easy solution.

Four assessors commented independently that high-quality work is being produced, but this is yet to break through consistently to be published in the very best international journals. On the other hand, several assessors commented on some valuable and promising new appointments having been recently made across the discipline, which augurs well for future success.
RESEARCH ASSESSMENT

CHEMICAL SCIENCES

RFCD code: 25

Major contributors: Research School of Chemistry (RSC); Faculty of Science; Research School of Physical Sciences and Engineering (RSPhysSE) in the specific area of physical chemistry.

Smaller contributors: Faculty of Engineering and Information Technology (FEIT); Research School of Earth Sciences (RSES); John Curtin School of Medical Research (JCSMR); ANU Supercomputer Facility.

The RSC is active in a diverse range of projects across the broad fields of organic and inorganic chemistry, physical and analytical chemistry, and theoretical and computational chemistry.

As expected in a teaching and research department with an obligation to cover most areas of the field, the research in the Department of Chemistry in the Faculty of Science covers many broad areas of the chemical sciences but with a more limited focus in any one field.

All three areas are active in research training in Chemistry, with significant numbers of PhD students as part of the research teams. The Faculty of Science provides an undergraduate Chemistry major in the Bachelor of Science degree, which, taken with honours, provides a platform for research training in Chemistry.

BIBLIOMETRIC ANALYSIS

Journal publication is the normal mode for reporting research results in the chemical sciences; e.g. 89% of the RSC output appeared in ISI-linked journals. The ANU has a high citation rate in Chemical Sciences, currently 30% above the world average. This strong citation performance is also reflected in the proportion of output appearing in journals classified to the highest impact quartile – over 50%.

The citation rates for Chemistry in the major areas are above the world average.

*cpp = citations per publication

ANU’s citation per publication rate dipped in the mid-1980’s and there was a marked upswing in the 1990’s. At all points, the ANU rate was higher than comparable university, national and world averages.
COMMENTARY
Research in Chemistry at the ANU rates highly on a world scale. There is work in all areas that is assessed as good, creative, work some of which is at the highest of international standards with approximately 1/3rd of the output assessed as being within the top 5% world-wide and nearly 3/4ths in the top 25%. The span of research is diverse – a feature that results in a lot of student choice and is consistent with the needs of chemistry majors to undergraduate students. The assessment of RSC reveals greater focus, consistent with the capacity to select research topics because of their intrinsic merit and interest to researchers and where the advantage of a capacity to concentrate effort is available to the IAS.

This judgement of the assessors is complemented by the bibliometric analysis. This shows that the citation rate per paper for the ANU overall and each of the major contributors is higher than the world average. The RSC publications are appearing in journals with extremely high average impact, although their citations fall short of expected levels: high quality work in high quality journals with a lower than expected citation rate for work in those journals.

Comments were made by assessors about younger staff coming through and replacing those recently retired or close to retirement. The work of the most junior categories of academic staff were not included in this assessment; most of these staff work with more senior colleagues and their contribution appeared in conjunction with those colleagues.

An external review of the Department of Chemistry earlier in 2004 recommended that a priority be placed on enhancing the quality and quantity of interactions between RSC and the Department. This recommendation has been accepted by both areas and a joint professorial appointment is anticipated. It will continue to be vital for the Department to manage both focus and breadth through the careful choice of people and areas for research.

RSPhysSE output accounts for about 20% of assessable work, almost all in the area of physical chemistry. Publications in this area have high impact and a citation rate at or above the chemistry average at the ANU, despite the fact that the majority of output from RSPhysSE has come from early to mid career researchers.

| Number of pieces of work sampled for assessment: | 306 |
| Number of Assessors: | 21 |
| Number of staff with work submitted: | 75 |
| IAS | 48 |
| Faculties: | 18 |
| Centres | 9 |
| Number of Higher Degree research students (2004) EFTSU: | 73 |
RESEARCH ASSESSMENT

EARTH SCIENCES

RFCD code: 26

Major Contributors: Faculty of Science, Research School of Earth Sciences (RSES)

Smaller Contributors: Research School of Physical Sciences and Engineering (RSPhysSE)

This area of research incorporates studies of Geology, Geochemistry, Geophysics. Research in Paleontology is conducted in the Faculty of Science.

RSES has the country’s premier concentration of basic research facilities in experimental and observational geoscience including: the Australian National Seismic Imaging Resource (ANSIR), the Sensitive High Resolution Ion Micro-Probe (SHRIMP) facility, and the Quaternary Dating Research Centre which houses a complete set of facilities for dating the record of Earth systems over the past million years.

In the Faculty of Science, the Department of Earth and Marine Sciences covers research in Igneous Petrology & Geochemistry, Deformation processes and economic geology, Crust/Mantle mineral-melt equilibria and Palaeoceanography.

BIBLIOMETRIC ANALYSIS

ISI has a wide coverage of journals in the earth sciences; e.g. it covers 85% of RSES’s journal publications, representing 73% of their total output.

<table>
<thead>
<tr>
<th></th>
<th>No of</th>
<th>% of ANU</th>
<th>Cpp</th>
<th>Impact relative to World</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAS</td>
<td>687</td>
<td>85</td>
<td>5.32</td>
<td>1.60</td>
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<td>RSES</td>
<td>578</td>
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<td>5.63</td>
<td>1.69</td>
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<td>Go8</td>
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<td>3.33</td>
<td>1.00</td>
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</table>

The ANU’s citation rate in this field is over 50% above the world average. RSES publications have an even higher impact, nearly 70% above the world benchmark. Over half the ANU’s publications appear in journals allocated to the top impact quartile, with very few in journals from the bottom two quartiles. The strength of its citation performance is also reflected in its achievement of well above the expected citation level for this high impact set of journals.

Over the period covered by the REPP database, the ANU has always attained a citation rate at least 50% above the world level.
COMMENTARY
The Department is seen to be “highly successful in attracting research support, including through the CRC program”. The Department is noted to have a “large group of international and national PhD students”. Recently, the Department has been strengthening graduate numbers by enrolments in the Mphil program. EMS is regarded as having “high productivity” in terms of its graduate student completions and attractiveness to international doctoral students.

Most of the assessors selected by the Geophysics area of the School (RSES) were unable to provide their assessment of the School’s research performance. Consequently several of our distinguished Geophysics staff members, including an FRS, several fellows of the Australian Academy of Sciences and the American Geophysical Union who have made outstanding contributions in a broad range of fields of Earth Sciences, were not included in the assessor’s performance reports. This also explains why, despite representing approximately 30% of the research activity in earth sciences at the ANU, geophysics was not directly identified in the quality and performance assessment.

| Number of pieces of work available for assessment: | 369 |
| Number of Assessors: | 6 |
| Number of staff with work submitted: | 103 |
| IAS | 65 |
| Faculties: | 38 |
| Centres | 0 |
| Number of Higher Degree research students (2004) EFTSU: | 63 |
RESEARCH ASSESSMENT

ECONOMICS

RFCD code: 34

Major contributors: The Faculty of Economics and Commerce (FEC); the Research School of Social Sciences (RSSS); the Research School of Asia Pacific Studies (RSPAS); the Asia-Pacific School of Economics and Government (APSEG); the National Graduate School of Management (NGSM); the Centre for Aboriginal economic and Policy Research (CAEPR); the Centre for Resource and Environmental Studies (CRES).

Smaller contributors: National Centre for Epidemiology and Population Health (NCEPH).

In terms of numbers of publications submitted for this review, and therefore the number of researchers active in the field, Economics is the largest research discipline at the Australian National University.

It is also the most diverse and the most dispersed discipline. As listed, Economics is a major focus in seven academic units and there are a number of additional areas with a smaller interest.

BIBLIOMETRIC ANALYSIS

Journals are not the most common media for communicating economics research. Even where journal outlets are used, only a small proportion is indexed by ISI e.g. only 22% of Faculty of Commerce and Economics output appears in ISI indexed journals. As a result, bibliometric analysis of this discipline must be interpreted with caution. Additionally care is also required as the ISI citation indices have a stronger focus on American research in economics than is the case for most science disciplines.

<table>
<thead>
<tr>
<th>Quality of research:</th>
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<th>Exceptionally significant (World’s top 5%)</th>
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<tr>
<td></td>
<td>55%</td>
<td>24%</td>
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</tbody>
</table>

<table>
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<tr>
<th>Assessors Rating of ANU in the field</th>
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<tbody>
<tr>
<td>No. of Assessors:</td>
</tr>
<tr>
<td>Top 25</td>
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<table>
<thead>
<tr>
<th>Faculty</th>
<th>No of Pubs</th>
<th>% of ANU</th>
<th>Cpp</th>
<th>Impact relative to World</th>
</tr>
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<tr>
<td>APSEG</td>
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<td>9</td>
<td></td>
<td></td>
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<tr>
<td>MSI</td>
<td>20</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IAS</td>
<td>99</td>
<td>39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSPAS</td>
<td>26</td>
<td>10</td>
<td></td>
<td></td>
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<tr>
<td>RSSS</td>
<td>47</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Faculties</td>
<td>44</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fac Econ Com</td>
<td>39</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unspecified</td>
<td>87</td>
<td>35</td>
<td></td>
<td></td>
</tr>
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<td>ANU TOTAL</td>
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<td>100</td>
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<td>0.76</td>
</tr>
<tr>
<td>Go8</td>
<td>933</td>
<td>1.21</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>1445</td>
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<td>0.74</td>
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</tr>
<tr>
<td>World</td>
<td>38111</td>
<td>1.57</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>
Nevertheless, the ANU has a sufficient number for an analysis of economics publications to be undertaken.

Publications in economics journals come from a number of areas across the university, and there is also a significant proportion (35%) that cannot be assigned to a particular area on the basis of address details.

The ANU’s citation rate has been falling since the early 1990s and is currently below the world average, though still above the Australian average.

Its publications are appearing in journals with a quartile spread in line with the discipline as a whole. However, it falls short of achieving the citations expected for this set of journals.

**COMMENTARY**

The task of assigning an overall evaluation to economics at ANU is problematic. There was a significant degree of variation in the assessments of the same research given by individual assessors.

This variation may not be surprising given that both the research itself, as well as the assessors, are approaching the discipline from perspectives ranging from economic theory, through economic policy, development economics, Asian and Indigenous economics through to the economic aspects of resource management. On top of which, there is the fact that applied economists apparently tend to ‘write mainly for other economists in their own countries’. In no way should such a focus been seen as inappropriate. Part of what we must do as a University is to seek to influence local policies and directions – important for Australia though possibly less interesting for the international academic community.

To illustrate the differences, there was a wide variation in the ratings made by the seven assessors of applied economics. For instance, one assessor rated the work of one area as 95% world class, while another judged that none of the 74 publications were in the top 25%.

Economics was the one discipline in the entire review with such disparity and apparent inconsistency. Perhaps the differences of view of economists that appear in the popular press is a true reflection of the differences between scholars who begin with the starting paradigm and little generosity in their acceptance of the legitimacy of other perspectives.

A key challenge is meeting the international norms of the discipline (which emphasise the reporting of theoretical and methodological innovation) and fulfilling an important element of ANU’s national mandate of reporting applied research, very often based on innovative methodologies, on policy issues.

Notwithstanding the disparities, the need for special caution in interpreting the bibliometric data in this field, the combination of assessments and the data suggest that the ANU needs to give particular attention to the future directions of economics research.

The overall numerical assessment for the discipline is somewhat lower than average for the ANU as a whole, as are assessors’ ranking of the ANU in comparison to the world’s best universities. Nevertheless, the sum of the assessors reports indicates that economics as a whole at the ANU is firmly amongst the world’s best one hundred universities.

| Pieces of work available for assessment: | 419 |
| Number of Assessors: | 15 |
| Number of staff: | 118 |
| IAS | 48 |
| Faculties: | 32 |
| Centres | 38 |
| Number of Higher Degree research students (2004) | 56 |
| EFTSU: | 48 |

Chapter 2: The Quality of Research 118
RESEARCH ASSESSMENT
ENVIRONMENTAL RESEARCH
RFCD code : 30

**Major Contributors:** Faculty of Science, Centre for Resource and Environment Studies (CRES), Research School of Pacific and Asian Studies (RSPAS).

**Smaller Contributors:** APSEG, CAEPR, HRC, NCEPH.

The Faculty of Science and CRES have a similar distribution of research in this field, with both examining Soil and Water Science, Resource Management and Forestry (the largest field for both these areas), Landscape Ecology, and Global Information Systems and Modelling (including Geomatic and Mapping). RSPAS concentrates its Environmental research in the sub-field of Resource Management in Asia and the Pacific.

**Bibliometric Analysis**
While journal outlets are the most frequently used means for communicating research results in environmental sciences, ISI’s coverage of the discipline is not as comprehensive as in others: e.g. 63% of the CRES output between 1999 and 2001 was in journals, but only 75% of those articles were indexed by ISI (48% of the total output). Some caution therefore needs to be exercised in extrapolating the results of bibliometric analysis to the discipline as a whole.

Australia’s citation rate sits just below the world average, but ANU's is among the lowest of those universities with sufficient publications to be included in an analysis.

It is publishing in journals with a lower than average impact, and also fails to achieve the expected level of citations for these journals. This result is also reflected in the set of high impact publications – the ANU has no publications in the top 1%, and only 2 in the top 5% when we would expect to see 6 or 7 publications, given the size of its output. The ANU’s citation rate in environmental sciences reached a peak in the mid 1990s but has declined sharply since this period.
**COMMENTARY**

Assessment by discipline of this multi-disciplinary field is inherently difficult. The worth of a publication in environmental research may lie as much in its broader context as in its basic disciplinary quality. Research output can appear in a variety of forms and in relatively new journals. The reviewers’ qualitative comments are generally stronger for CRES than the bibliometric outcomes. Environmental research at ANU is a feature of the research profile of many areas. It is most often inter and multi-disciplinary.

The assessors’ reports were generally positive.

Notwithstanding the need to interpret the bibliometric analysis with particular caution, the citations and the assessments seem to converge: the work on average is good quality but only in selected parts is it excellent.

| Number of pieces of work available for assessment: | 205 |
| Number of Assessors: | 11 |
| Number of staff with work submitted: | 62 |
| IAS | 23 |
| Faculties: | 31 |
| Centres | 8 |
| Number of Higher Degree research students (2004) EFTSU: | 101 |
RESEARCH ASSESSMENT

HISTORY AND ARCHAEOLOGY

RFCD code: 43

Major Contributors: Faculty of Arts, Faculty of Asian Studies, Research School of Pacific and Asian Studies (RSPAS), Research School of Social Sciences (RSSS), Centre for Cross Cultural research (CCCR), Humanities Research Centre (HRC).

Smaller Contributors: Centre for Resource and Environmental Studies (CRES).

In the Faculty of Arts, all major areas of history research are covered, in addition to extensive teaching in the area. The largest areas of study are Australian History (including Indigenous History), and Medieval and Modern European and American History. The RSPAS, and the Faculty of Asian studies, naturally concentrate research on Asia, with the Division of Pacific and Asian History at RSPAS maintaining a distinguished record of research and graduate supervision in the fields of Pacific Islands, Chinese, Japanese and Southeast Asian history. By far the largest contribution of RSSS is in field of Australian History, including Australian Biographical History. Similarly the HRC and CCCR have produced much important work on Australia. The HRC also has a strong showing in the field of American and European History.

At RSPAS, the Department of Archaeology and Natural History is the major regional research centre for the study of archaeology and palaeoenvironmental change in the Pacific Islands, Southeast Asia and New Guinea. The Department maintains the Indo-Pacific pollen collection and well-equipped laboratories for the study of ceramics, bone, shell, pollen, phytoliths and charcoal.

Work at the Faculty of Arts’ School of Archaeology and Anthropology Research is conducted in biological and sociocultural anthropology. The biological anthropology staff of the School specialises in human biology and in nonhuman primates, but have research experience in human variation and palaeoanthropology as well. Recently, specialisations have expanded into skeletal analysis, forensic anthropology and domestication studies. Interests in Biological Anthropology at ANU has grown through the 1990s, and this area of the School now attracts high quality postgraduate students, postdoctoral fellows and visiting fellows from all over the world.

The Australian Dictionary of Biography (RSSS) is an important resource for historians and indeed for the Australian community.

BIBLIOMETRIC ANALYSIS

As in most social science and humanities disciplines, journals are not the most common mode for reporting history and archaeology research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 21% of RSSS output, and just 6% of Faculty of Arts output, appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.
COMMENTARY

History covers a range of focal areas from Australian history through the historical study of different parts of the Asia Pacific region to the history of Europe and America. Research on each of these areas is located in different part of the ANU and each has its particular distinctive strengths. The assessments reflect this breadth and diversity as well as the overall quality of history at the ANU.

Some significant work does not seem to have been assessed. Ann Curthoys’ book Freedom Ride won the Stanner Award for the best published contribution of Australian Aboriginal and/or Torres Strait Islander Studies. It was also commended and short-listed for a number of other awards. Mark McKenna’s Looking for Blackfellas’ Point: An Australian History of Place, won the book of the Year and the Douglas Stewart Prize for non-fiction in the NSW Premier’s Literary Awards.

It appears from several assessor comments that the division of archaeology into two sub-disciplines for the purposes of assessment – Asian and Pacific Archaeology; and Near-East, European and Classical Archaeology – has perplexed some assessors as it has resulted in some researchers’ work being split between the two fields. The fact that several archaeologists hold joint appointments between RSPAS and the Faculty of Arts has compounded the problem. One assessor identifies that this has had an effect on his numerical ratings.

Furthermore, of the three assessors for “Asian and Pacific Archaeology” two rated ANU as in the top 50 universities in the world; the other rated in the top 25. The single assessor for “Near-East, European and Classical Archaeology” rated ANU in the top 200. These two sub-disciplines were given equal weight in calculating a position for ANU in archaeology as a discipline.

| Number of pieces of work available for assessment: | 487 |
| Number of Assessors: | 20 |
| Number of staff with work submitted: | 147 |
| IAS | 56 |
| Faculties: | 60 |
| Centres | 31 |
| Number of Higher Degree research students (2004): | 140 |
RESEARCH ASSESSMENT

INFORMATION SCIENCES AND ENGINEERING

RFCD codes: 28 and 29

Major Contributors: Faculty of Engineering and IT (FEIT), Research School of Information Sciences and Engineering (RSISE), Research School of Physical Sciences and Engineering (RSPhysSE).

Minor Contributors: Faculty of Science, the Mathematical Sciences Institute, ANU Supercomputer Facility, National Graduate School of Management (NGSM).

Collaborative research is important in the relationship between FEIT and RSISE, and shows in some assessments, though the assessor comments relate to the units individually. The largest outputs are in formal methods, machine learning (including Robotics) and Signal Processing, at RSISE. Although strong in this area, a significant portion of research at FEIT has been in the field of Information Theory, Computer Software and Computation Theory. At RSPhysSE, research has been specialised in the areas of Mesoscopic and Nanomaterial research, and Photonic Devices.

BIBLIOMETRIC ANALYSIS

Two RFCD divisions are represented in this ‘field’ – Information, Computing and Communication Science; and Engineering and Technology. The ANU has insufficient publications in the former, so this analysis is restricted to engineering. Journal output is a relatively minor mode for communicating research in computing sciences, which accounts for the low number of publications; e.g. only 34% of FEIT output is in ISI journals, and just 25% of RSISE output. It is at a similar level for engineering, but in this case there are sufficient publications to undertake an analysis – however, care must be exercised in its interpretation as it represents such a small proportion of the disciplines total output.

<table>
<thead>
<tr>
<th>Quality of research:</th>
<th>Internationally excellent (World’s top 25%)</th>
<th>Exceptionally significant (World’s top 5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63%</td>
<td>33%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessors Rating of ANU in the field</th>
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</thead>
<tbody>
<tr>
<td>Top 25</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>No. of Assessors:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No of Pubs</th>
<th>%</th>
<th>Cpp relative to World</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANU total</td>
<td>479</td>
<td>100</td>
</tr>
<tr>
<td>IAS</td>
<td>347</td>
<td>72</td>
</tr>
<tr>
<td>RSC</td>
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<tr>
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<td>2.09</td>
</tr>
</tbody>
</table>

Chapter 2: The Quality of Research
The ANU's citation rate in engineering journals is 30% above the world level. Nearly half its publications are placed in journals in the top impact quartile, with very few appearing in the lowest quartile. It achieves very close to the expected level of citations for this high impact journal set.

The citation performance of the cluster of publications from the RSPhysSE is particularly strong, with publications appearing in high impact journals and achieving an actual citation rate well above the expected level for these outlets. Publications from The Faculties are placed in lower impact journals, but still above the world and Australian levels, and achieving close to the expected number of citations.

The ANU's citation rate has been rising steadily in the last decade, but has not yet returned to the levels achieved in the early to mid 1980s.

**Commentary**

One Assessor queried as to why FEIT and RSISE don’t combine. That comment belies an understanding of the fundamental differences between the two; nevertheless discussions are underway as to a structure within which closer working relationships will be forged, without a formal merger. Also, of course, we do have several joint appointments, and research projects.

MSI has a small but strong group working in computational mathematics and modelling, and interacting with the MSI programs in analysis, statistics and geometry. The assessors appear to have appreciated the strengths of this arrangement.

Engineering publications from the RSPhysSE appear mainly in high impact journals and have citation rates more than 70% above the world average. Assessors for the two subdiscipline areas in which RSPhysSE research is focussed ranked the ANU effort in the top 25% of universities world wide. More than half the publication outputs over the review period have come from early to mid career researchers, which suggest a healthy future for engineering research within the School.

RSISE is very pleased with the strength of the assessors’ comments on its performance, and notes particularly the excellent international reputation ascribed to Systems Engineering under the leadership of Anderson and Moore for many years.

One assessor queries the “theoretical orientation” of RSISE and the fact that “data bases, data structures and algorithmic aspects” are not included in our research programs. The latter, in fact, form part of the research programs in the Faculty of Engineering and Information Technology, which is complementary to RSISE in many respects. We have taken a conscious decision to concentrate only on Automated Reasoning and Machine Learning in our Computer Systems Laboratory. In relation to theory versus applications it must be remembered that our CSL is fundamentally constructed as a theoretical department; having said that some applications work is about to commence. There is also a strong applications component in Systems Engineering, concerned particularly with robotics and submersible vehicles. Further, almost all of the work carried out in Telecommunications Engineering has an applied objective.
RESEARCH ASSESSMENT

LANGUAGE AND CULTURE
RFCD code: 42

Major Contributors: Faculty of Arts, Faculty of Asian Studies, Research School of Pacific and Asian Studies (RSPAS), Centre for Cross Cultural Research (CCR), Humanities Research Centre (HRC).

Smaller Contributors: Centre for Aboriginal Economic Policy Research (CAEPR), Research School of Social Sciences (RSSS), National Centre for Epidemiology and Population Health (NCEPH).

The broad field of language and culture encompasses linguistics, the study of literature in English and other languages, cultural studies both narrowly and broadly defined, and criticism and history of visual art, music, film and drama.

In addition to undergraduate teaching in the area, the Faculty of Arts produces the largest volume of research in these areas. The Faculty’s School of Language Studies focuses on Conversation Analysis, Language Teaching and Learning, Historical Linguistics, Semantics, Phonetics, Syntactic Theory and fieldwork in Australian Linguistics. A distinctive feature of the approach taken by staff in this field is a relationship to fieldwork and the description of less well-known languages, in conjunction with the Linguistics Department located in the RSPAS through the Centre for Research on Linguistic Change, a joint venture between the Faculty and the Research School. The Faculty’s Australian National Dictionary Centre focuses on the historical study of Australian English, primarily from a lexicographical point of view. The school is also home to research in a number of European literatures and languages.

The Faculty of Arts’ School of Humanities is home to its program in English literature. In addition to teaching loads, researchers at this school have conducted studies of Australian and American literature; eighteenth century British cultural history; theatre history; gender history; Romantic literary studies; writing in new media; postcolonial theory and literature; contemporary Asian literature and theatre, Asian-Australian studies; contemporary performance studies; Shakespeare and multimedia interpretations; erotic literature and Australian Indigenous writing.

Other areas in the Faculty of Arts have also contributed to language and culture research, particularly the Culture, Gender and Sexuality unit, and researchers at the Centre for Arab & Islamic Studies. The Faculty of Art’s School of Humanities has made a significant contribution to research in arts history and criticism. Art History and Curatorship in this School has the highest ratio of professorial staff of any discipline in the Faculty of Arts, and specializes in the histories of Australian and Asian art. The School also has a significant Film Studies program both in research and teaching, in which it collaborates with the School of Music.

The School of Music and the School of Arts in the Faculty of Arts make significant contributions in the areas of music history and criticism, ethnomusicology, art history and art theory. Two former Presidents of the Musicological Society of Australia are ANU staff – one, a twentieth-century music scholar, is perhaps Australia’s most eminent musicologist and also a former President of the Australian Academy of the Humanities. The other is perhaps Australia’s most distinguished indigenous music specialist and former Director of Research at AIATSIS.
Research in RSPAS covers all indigenous and metropolitan languages spoken in Pacific island countries, Papua New Guinea, East Timor, Indonesia, Malaysia and the Philippines, as well as indigenous minority languages of S.E. Asia and Taiwan. Research interests in indigenous languages cover the Austronesian and Mon-Khmer families, as well as the numerous families of Papuan Languages. Staff in this field also supervise several graduate and PhD programs.

The Faculty of Asian Studies share many of these research interests, but have also specialised in Thai-Lao linguistics, in Japanese, Korean and Chinese linguistics, and in Indonesian linguistics. The Faculty makes important contributions to the study of Asian culture, and has a distinguished reputation for its work on Asian religions.

The CCR has made important contributions to understandings of Aboriginal Art and Craft, Aboriginal Music, and Aboriginal Aesthetics, and the HRC has conducted important explorations of art and environment in colonial Australia, and of contemporary Asian and Pacific art and Art and Human Rights in the area of social justice.

**BIBLIOMETRIC ANALYSIS**

As in most social science and humanities disciplines, journals are not the most common mode for reporting literature research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 21% of RSSS output, and just 6% of Faculty of Arts output, appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

**COMMENTARY**

The assessment for linguistics and language studies across the ANU is extremely high – one of the highest for any discipline in the University. Over 80% of the work submitted was rated as “world class”, with fully 40% in the highest category of international significance.

This high standard was maintained across the three major schools and faculties in which linguistics is researched and taught. It is notable that this field is the site of a formal collaboration between the Faculty of Arts and the Research School of Pacific ad Asian Studies – the Centre for Research on Language Change. This research collaboration is complemented by collaborative teaching arrangements between the two areas. Clearly, such collaboration between the Faculties and the IAS has contributed in some measure to the consistent excellence of ANU research in linguistics.

Several assessors picked up on what seemed to be a low priority for foreign language research at the ANU, in particular in European languages. The ANU has already begun to address that, building language studies into a range of undergraduate programs such as the BA (International Relations) and the Bachelor of International Business (Asia), and the introduction of Spanish in 2005. With this teaching base, research publications will follow.

| Number of pieces of work available for assessment: | 471 |
| Number of Assessors: | 24 |
| Number of staff with work submitted: | 176 |
| IAS Faculties: | 6 |
| Centres | 126 |
| Number of Higher Degree research students | 44 |
| | 112 |
Major Contributors: Research in Law is concentrated at the Faculty of Law and at the Law Program and the Regulatory Institutions Network (RegNet) unit in the Research School of Social Sciences (RSSS), with a considerable amount of cooperative research between these areas.

Smaller Contributors: The Centre for Aboriginal Economic Policy Research (CAEPR), the Centre for Cross Cultural Research (CCCR), the Humanities Research Centre (HRC), and the Faculty of Engineering and IT (FEIT).

By far the largest field of Law research at the Faculty of Law is in the area of International Law and Human Rights, with a significant body of work conducted in the area of constitutional administrative law and intellectual property law. In addition to this research, the Faculty of Law has a very substantial teaching task, with 2000 undergraduate and postgraduate students, and a high student staff ratio. The Faculty of Law is also the region’s leading institution training barristers and solicitors, through the professionally accredited Graduate Diploma in Legal Practice.

In RSSS, the RegNet unit is the largest area of research is in the field of Law and Society, with significant contributions to knowledge in the fields of Criminology and Constitutional Law. Both the Faculty and the Research School supervise a substantial number of PhD students in Law research.

BIBLIOMETRIC ANALYSIS
As in most social science and humanities disciplines, journals are not the most common mode for reporting research in law. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 21% of RSSS output, and just 6% of Faculty of Arts output, appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

COMMENTARY
It is unfortunate that, due to unforeseen circumstances of the assessor, the assessment of the sub-discipline of Intellectual property was not submitted, as there is a significant concentration of research in that area, with 7 staff members in the faculty and 2 in RSSS.

In the Faculty, Intellectual Property scored the fourth highest number of publications in the Faculty (after International and Human Rights Law, Constitutional Law and Administrative Law) and the research is mainly organised in the specialist, externally funded centre - the Australian Centre for Intellectual Property in Agriculture.
RESEARCH ASSESSMENT
MATHEMATICAL SCIENCES
RFCD code: 23

Major Contributors: Mathematical Sciences Institute (MSI) (primarily), Faculty of Economics and Commerce, Faculty of Science, Faculty of Engineering and IT (FEIT)

Smaller Contributors: National Centre for Epidemiology and Population Health (NCEPH), Centre for Resource and Environment Studies (CRES), Centre for Mental Health Research (CMHR).

By far the largest output of Mathematical research is produced, as one would expect, at the Mathematical Sciences Institute. The MSI covers all major areas of research, with a focus on Analysis, including non-linear analysis and Geometry. The MSI is unique in its organisational structure, as it operates at the nexus of research schools, faculties and centres. Staff at the MSI collaborate with, and work at, the Faculty of Science and the John Curtin School of Medical Research.

Mathematical Research at FEIT is concentrated in the sub-field of Algebra, Topology and Logic, while research at the Faculty of Economics and Commerce is in Statistics and Actuarial Studies.

BIBLIOMETRIC ANALYSIS
SCI journals are the major outlet for research in the mathematical sciences at ANU, but not the only one. For the MSI, 63% of their output for 1999-2001 was in journals indexed by ISI. This leaves a significant proportion not covered by this analysis, and therefore some caution should be exercised in interpreting the data.

Over two-thirds of ANU's publications in this field come from the MSI, with small numbers from other areas, including the RSISE and FEIT. It should be noted that 30 publications (8% of all ANU publications in this field) have no further institutional identification, preventing us from allocating them to a particular area.
COMMENTARY

Algebra, topology and logic is a key discipline area for the Faculty of Engineering and Information Technology, and represents the main focus for two of our most distinguished Professors. Both are ARC Professorial Fellows, one is a Fellow of the Australian Academy of Science, and the other a Fellow of the IEEE. The reviewer read three papers authored by two other academics. The comments regarding FEIT are clearly directed at those papers only, and do not represent a complete evaluation of the Faculty's contribution in this field.

The Department of Mathematics is part of the Faculty of Science. It is also part of the Mathematical Sciences Institute being co-located with the Centre for Mathematics and its Applications, part of the IAS.

The relationships between staff in the two areas are extremely close, and academically staff in the Department of Mathematics enjoy very strong benefits from their access to staff with complete focus on research. In this way, the situation in Mathematical Sciences is very similar to the situation in Physical Sciences where the relationships are also very close, via shared appointments and common research interests. It is interesting that assessors have made such strong positive statements about research in these two areas where the connections between research and research-and-teaching staff are so strong. It is also interesting that it is not the structures of collaboration - quite different between Mathematical and Physical Sciences - but the fact of it that is important.

| Number of pieces of work available for assessment: | 250 |
| Number of Assessors: | 9 |
| Number of staff with work submitted: | 62 |
| IAS Faculties: | 36 |
| Centres: | 18 |
| Number of Higher Degree research students (2004): | 36 |
RESEARCH ASSESSMENT

PHILOSOPHY

RFCD code: 44

Major Contributors: Research School of Social Sciences (RSSS), Faculty of Arts.

Smaller Contributors: Faculty of Asian Studies, Centre for Cross Cultural Research (CCCR), Humanities Research Centre (HRC).

At RSSS, the Philosophy Program pursues research in metaphysics and epistemology (where this includes philosophy of mind and language, cognitive science, and philosophy of biology), and value theory (where this includes moral philosophy, moral psychology, philosophy of law, political philosophy, and philosophy of the social sciences). The Program also trains PhD students in these two core areas. The Program is very highly regarded in the international arena. According to the influential Philosophical Gourmet Report 2002-4, the Program ranks first in Australia and in the top 14 worldwide.

At the Faculty of Arts, Philosophy specialists at the School of Humanities balance undergraduate teaching with important research work. Their main fields of research are analytical philosophy; logic and the philosophy of science; 19th and 20th century Continental philosophy (including Film and Philosophy, and Philosophy and Gender); history of philosophy and aesthetics; and moral, political and social philosophy. Research fields include specialisations on science and philosophy; film and philosophy, the work of Karl Popper; feminist philosophy and political ethics.

The Faculty of Asian Studies has research expertise on Chinese, Islamic and Buddhist philosophies.

BIBLIOMETRIC ANALYSIS

As in most social science and humanities disciplines, journals are not the most common mode for reporting philosophy research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 21% of RSSS output, and just 6% of Faculty of Arts output, appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

COMMENTARY

While only two assessors were able to participate in the end their ratings concurred.

<table>
<thead>
<tr>
<th>Quality of research:</th>
<th>Internationally excellent (World’s top 25%)</th>
<th>Exceptionally significant (World’s top 5%)</th>
</tr>
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<td></td>
<td>89%</td>
<td>62%</td>
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<table>
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</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Number of staff with work submitted:</td>
<td>34</td>
</tr>
<tr>
<td>IAS</td>
<td>20</td>
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<td>Faculties:</td>
<td>11</td>
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<td>Centres</td>
<td>3</td>
</tr>
<tr>
<td>Number of Higher Degree research students (2004):</td>
<td>42</td>
</tr>
</tbody>
</table>
Major Contributors: Research School of Physical Sciences (RSPhysSE), Faculty of Science, Mathematical Sciences Institute (MSI).

Smaller Contributions: Faculty of Engineering and IT (FEIT), Research School of Chemistry (RSC), ANU Supercomputer Facility.

The physical sciences are clearly an area of major research strength at the ANU. The University can justifiably claim to be a world leader in physics research. The majority of assessors indicated that the ANU was among the world’s top 25 institutions.

The majority of the work in the Physical Sciences at the ANU takes place in the Research School of Physical Sciences and Engineering. An important contribution is also made by the Faculty of Science, in the areas of quantum and atom optics and in gravity wave research. The Mathematical Sciences Institute is also very active in theoretical physics research.

The single largest broad area of physical sciences research is in atomic, molecular and quantum optics.

**BIBLIOMETRIC ANALYSIS**

While a significant proportion of publications in the physical sciences are to be found in non-journal outlets, particularly in conference publications, ISI indexed journals are the main media for research dissemination; e.g. 71% of RSPhysSE output for 1999-2001 appeared in ISI indexed journals.

The ANU has the largest output of any Australian institution in the physical sciences, with over 1,500 publications in the five year period; and it also has the highest citation rate, nearly 40% above the world average. All areas within the ANU contribute to this high citation impact.

Half the ANU’s total publication output appears in journals classified to the highest impact quartile. In addition, one-quarter of all the most highly cited Australian publications are from the ANU.

The ANU’s citation rate has increased significantly since the beginning of the 1990s, and has moved considerably above all other benchmarks – Go8, national and world.
COMMENTARY

Research in the Physical Sciences at the ANU has received a uniformly excellent appraisal by the international assessors. This assessment, which is based on 526 featured publications from 124 staff (roughly 40% of whom are early career researchers), clearly rates the overwhelming majority of the research activities as world class, with 41% of the research deemed to fit the Exceptionally Significant category (world’s top 5%). That this result has been obtained in a relatively uniform fashion across the 9 sub disciplines, indicates the enormous strengths within the discipline at the ANU. Indeed, in general, the Physical Sciences at the ANU was ranked by 9 of the assessors to be in the top 25 institutions in the world, and by another 5 to be in the top 50.

This assessment is nicely complemented by the bibliometric analysis which, based on a large number of publications (>1500) over the five year period, provides for a statistically rigorous comparison with national and international averages. For instance the impact of ANU publications in the Physical Sciences is 40% greater than the international average and 20% greater than that of the Group of 8 Australian universities.

We note that not all assessors provided written comments on their sub-discipline. Notably there were no written comments on the extensive activities in materials science, mainly located in RSPhysSE, despite this sub-discipline receiving an extremely high rating, with 95% of the work considered world class.

Many junior staff were included in the assessment exercise and several assessors commented on the quality of their work and the promise that this holds for the future of the various sub-disciplines in physical sciences at the ANU.

Scientists in the Faculty of Science combine research at the highest level in several areas (quantum & atom optics, gravitational waves and nuclear physics) but place equal seriousness on their obligations in teaching and the training of the next generation of outstanding physicists. A review of this from the Australian Institute of Physics commented

| Number of pieces of work available for assessment: | 560 |
| Number of Assessors: | 17 |
| Number of staff with work submitted: | 133 |
| IAS | 114 |
| Faculties: | 15 |
| Centres | 4 |
| Number of Higher Degree research students (2004): | 102 |
very favourably on how intertwined Physics research and teaching are across the ANU. They commented on the way that the Department manages to do this not just for the advanced students but for all Physics majors. The faculty members are very young and have been selected for their expertise and enthusiasm for teaching as well as research ability. They carry the load for all experimental teaching in parallel to taking leading roles in national Centres. Through this ANU has become the attractor for the most talented students across Australia and the location of choice for students focused on research.

The Department of Mathematics is part of the Faculty of Science. It is also part of the Mathematical Sciences Institute being co-located with the Centre for Mathematics and its Applications, -part of the IAS. The relationships between staff in the two areas are extremely close, and academically staff in the Department of Mathematics enjoy very strong benefits from their access to staff with complete focus on research. In this way, the situation in Mathematical Sciences is very similar to the situation in Physical Sciences where the relationships are also very close, via shared appointments and common research interests. It is interesting that assessors have made such strong positive statements about research in these two areas where the connections between research and research-and-teaching staff are so strong. It is also interesting that it is not the structures of collaboration – quite different between Mathematical and Physical Sciences – but the fact of it that is important.
**RESEARCH ASSESSMENT**

**POLICY AND POLITICAL SCIENCES**

RFCd code: 36

**Major Contributors:** Research School of Pacific and Asian Studies (RSPAS), Faculty of Arts, Research School of Social Sciences (RSSS), Asia-Pacific School of Economics and Government (APSEG), Centre for Aboriginal Economic Policy Research (CAEPR).

**Smaller Contributors:** Faculty of Asian Studies, Humanities Research Centre (HRC), Faculty of Law, Centre for Resource and Environmental Studies (CRES), National Centre for Epidemiology and Population Health (NCEPH).

While research work in this field is fairly evenly distributed at the Faculty of Arts and RSSS, it is more concentrated in other areas. APSEG concentrates its political science research in the areas of Public Policy and Comparative Government, while CAEPR concentrates mostly on Public Policy on indigenous affairs. RSPAS produces the most amount of Comparative Government and Politics research, at its Contemporary China Centre, Department of Political and Social Change, and State, Society and Governance in Melanesia Project.

RSSS produces the largest number of outputs in the sub-fields of Political Institutions and Political Theory. Research in these areas is conducted in the Australian Centre for Social Research, the Political Science Program, and the Social and Political Theory Program. In addition, the RSSS supervises large numbers of postgraduate students in Political Science.

The Department of International Relations at RSPAS has greatly impressed assessors with its research over the last ten years. Researchers at the Department have contributed to, founded, and edited some of the most respected international journals in this discipline, including the Cambridge University Press Asia-Pacific series, *International Politics*, *Asian Survey*, *Pacific Affairs*, and *International Relations*. Their field of research includes international relations theory, international political economy, international security, the study of regionalism, global environmental politics, state formation and the forced displacement of peoples, human rights, culture and international relations, China’s foreign relations, the international politics of the Pacific, and human rights and civil society. The Department also supervises around 20 doctoral students, and around 100 Master’s students.

The Department’s work is complemented by work at the Strategic and Defence Studies Centre at RSPAS. The Centre’s research includes global nuclear policy options, arms proliferation challenges, changing alliance relationships, international intelligence issues, new concepts of strategy, the potential for new military operational approaches, security cooperation in the Asia-Pacific, challenges for Australian defence strategy and planning, defence transformation options for Australia, and the nature of terrorist challenges confronting the Asia-Pacific, amongst others.

At the Faculty of Arts, the Centre for Arab & Islamic Studies specialises in world-eminent research into Arab, Islamic, Middle Eastern and Central Asian politics. The Center’s work includes include the geopolitics of Afghanistan, Russian client states, Islam and the West and the strategic significance of Iran.

Also in the Faculty of Arts, the School of Social Sciences (distinct from RSSS) offers an excellent undergraduate programme in International Relations. Academics in this area also
conduct important International Relations research, both alone and in collaboration with scholars at RSPAS.

**BIBLIOMETRIC ANALYSIS**

As in most social science and humanities disciplines, journals are not the most common mode for reporting political science research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 21% of RSSS output, and just 6% of Faculty of Arts output, appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

**COMMENTARY**

This is an area that should be especially strong in the National Capital. The assessors comments make it clear that there is a real strength here at the ANU.

[ARTS] Overall, areas where there is a lot of work on Australia might have been given less attention by assessors than more theoretical/international work.

Much of the research on politics and comparative government in the Department of Political and Social Change and in the State Society and Governance in Melanesia Project in RSPAS has focused on Melanesia. Nowhere else is there comparable research on the Melanesia region. It has to be recognized that the regional character of this research and its specific policy orientation does not attract the same international recognition as similar research on China or Indonesia.

There is strong research in both RSPAS and the Faculty of Arts and they are increasingly involved in teaching collaboration. A dozen Honours students from the Faculty have taken Masters courses in RSPAS in 2004. Some of these students may go on to take PhD programs in RSPAS. There is substantial scope for teaching and research synergies as more students reach Honours level – the BAIR only began in 2002 so the first big cohort of Honours students won't reach Fourth Year till 2005.

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<tr>
<td>Number of pieces of work</td>
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<td>IAS Faculties:</td>
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<tr>
<td>Centres</td>
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<tr>
<td>Number of Higher Degree</td>
<td>184</td>
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<td>research students (2004):</td>
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</table>
RESEARCH ASSESSMENT

PSYCHOLOGY AND MENTAL HEALTH RESEARCH

RFCD code: 38 (not 3802, 321204,321201)

Major Contributors: Faculty of Science, Centre for Mental Health Research (CMHR), Research School of Social Sciences (RSSS).

Smaller Contributors: Faculty of Law, Faculty of Engineering and IT, Research School of Physical Sciences and Engineering (RSPhySE), National Centre for Epidemiology and Population Health (NCEPH), National Graduate School of Management (NGSM).

In addition to a prestigious undergraduate teaching programme, the Faculty of Science’s School of Psychology conducts research within three broad groups: social psychology, cognitive/ perceptual and clinical/health. Developmental psychology is covered under all three areas and the biological basis of behaviour is studied in relation to the cognitive/perceptual and clinical/health group.

Research in social psychology is conducted at the Law programme at RSSS (distinct from the Faculty of Law) as part of this programme’s broad approach to the evaluation of public regulation.

The Centre for Mental Health Research specialises in research into cognitive ageing. This small centre supervises 11 PhD students. The Centre has also produced risk factor research, particularly in ageing, dementia and depression since it began in 1975. Currently their major study in this area is the PATH Through Life project, a cohort sequential longitudinal study of genetic, physiological, brain and psychosocial risk factors measured in 7,500 individuals in three age ranges. The study commenced in 1999 and is due for completion in 2018.

The Centre for Mental Health Research has two primary research foci (a) longitudinal research studies of risk factors and determinants of common mental disorders, in particular depression, anxiety, substance misuse, and cognitive decline and dementia; and (b) public health interventions to prevent common mental disorders and to improve the public’s mental health literacy. The Centre also has three research units which cut across these broad foci: Ageing Research Unit, Depression & Anxiety Consumer Research Unit, and Family & Community Health Research Unit. The Centre has 12 academic staff members, and supervises 18 PhD students.

At the Faculty of Science, Mental Health Research is conducted in Clinical/Health areas at the School of Psychology. In addition to a heavy teaching load, researchers in this area have concentrated on substance related disorders, the assessment of behavioural problems in children, psychological health and attachment and eating disorders.

<table>
<thead>
<tr>
<th>Quality of research:</th>
<th>Internationally excellent (World’s top 25%)</th>
<th>Exceptionally significant (World’s top 5%)</th>
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</thead>
<tbody>
<tr>
<td>No. of Assessors:</td>
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<td>Top 50</td>
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<td>3</td>
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Chapter 2: The Quality of Research
ANU CAPABILITIES AND PERFORMANCE STATEMENT

**Bibliometric Analysis**

Publication practices in the Behavioural and Cognitive Sciences are more focussed on ISI journal outlets than other social science disciplines, but there is still a significant proportion that is published through other modes of communication, and a significant proportion that cannot be identified with an area of the university.

The ANU citation rate in psychology is above the world level. It does not have as many publications in the most highly cited clusters as would be expected for the size of its output, but it is publishing in high impact journals. More than half its output appears in journals classified to the top impact quartile, with very few placed in journals in quartile 4. It falls short of the expected number of citations for its high impact journals.

The ANU exhibits some volatility in citation rates over time, as the analysis is based on a relatively small number of publications. However it has remained above the world and Australian levels for the last decade.

**Commentary**

The assessors are very positive about research in this area, both of them placing ANU in the top 100 institutions in the field as well as giving a high percentage in the top 25%.

<table>
<thead>
<tr>
<th></th>
<th>No of Pubs</th>
<th>% of ANU</th>
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<td>RSSS</td>
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<td>Fac Sci</td>
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<td><strong>ANU total</strong></td>
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<td><strong>3.07</strong></td>
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The number of pieces of work available for assessment: 186

Number of Assessors: 7

Number of staff with work submitted: 50

IAS

Faculties: 6

Centres: 24

Number of Higher Degree research students (2004): 36
Major Contributors: Research School of Pacific and Asian Studies (RSPAS), Faculty of Science, Research School of Social Sciences (RSSS), Faculty of Arts, Faculty of Asian Studies, Centre for Aboriginal Economics and Policy Research (CAEPR), National Centre for Epidemiology and Population Health (NCEPH), Centre for Cross-Cultural Research (CCR)

“Studies in Human Society” is a broad field, encompassing sociology, anthropology, human geography, and demography. Within these research areas, ANU has particular foci – for instance, the anthropology of both Asia and the Pacific in RSPAS; the policy aspects of sociological and demographic research in RSSS; or the cross-disciplinary and cross-institutional approach to gender studies, drawing on all these perspectives.

Sociology
The Australian Centre for Social Research at RSSS and NCEPH both concentrate applied and theoretical sociological research on Australian societies. Work at RSSS includes considerable overlap with the related disciplines of demography, economics, econometrics, political science, and public health policy, while NCEPH has fostered an understanding of the broader sociological factors of health. The Law unit at RSSS (distinct from the Faculty of Law) has also produced important work in social policy research. RSSS also has a prominent PhD programme in sociology, with several PhD graduates taking up research positions at the school.

The teaching and research interests of the sociology staff in the Faculty of Arts are concentrated in sociological theory, research methods and the relationship between society and a wide range of issues, particularly education, health and illness, gender, ethnicity, environment, politics, population and third world development. The Head of the School of Social Sciences, Professor Frank Lewins, is also the research team leader for a major externally funded project involving up to 20 postgraduates called ‘Immigration Bridge Australia’.

At RSPAS, the Contemporary China Centre and the Division of Pacific and Asian History have broadened their respective political and historical foci to include applied sociological examinations of China and Taiwan, and of Pacific, Japanese and Southeast Asian societies.

Geography
In RSPAS, the Department of Human Geography undertakes research in the Philippines, Thailand, Indonesia and Papua New Guinea.

In the Faculty of Science, the School of Resources, Environment and Society (SRES, formerly separate Departments of Forestry and Geography & Human Ecology) addresses the challenges of sustainability. SRES staff and research students work on a wide range of topics across the environmental sciences, natural resource management, and societies’ interactions with the environment. Research focuses both on aspects of the natural and the social sciences, and on their integration.

Demography
Demography at the ANU is conducted mainly by three academic units. The Research School of Social Sciences is by far the largest, with more than ninety publications submitted for
assessment on a variety of topics. There is a particular focus on Australia demography, specifically to inform policy. However, other research areas range from the fertility and reproductive health, through historical demography, to the demography of work, employment organisational sociology.

Of the smaller areas, research at the Centre for Aboriginal Economic and Policy Research clearly has a focus on indigenous demography. The National Centre Epidemiology and Population health employs demography as one of many disciplinary tools for inter-disciplinary research in its Population, Health and Development program, which explores the interaction between health, culture, socio-economic change, and population.

Anthropology
The School of Archaeology and Anthropology in the Faculty of Arts has a broad research program in socio-cultural anthropology, covering a wide variety of topics. It also contains a specialist group of researchers into bio-anthropology. Gender Studies researchers were instrumental in founding the International Journal of Feminist Politics. Other funded research projects include the politics of addiction; the impact of performance-enhancing drugs and the cultural politics of the stolen generation. The Faculty offers undergraduate and postgraduate degree programs in anthropology.

RSPAS has a long-established research program in anthropology, specializing in the anthropology of the Southwest Pacific, Southeast Asia and China. Anthropology in RSPAS also has a long and successful history in research training. The Gender Relations Centre has pursued comparative research on gender and sexuality across the regions of Asia and the Pacific, drawing on the disciplines of history as well as anthropology.

Anthropology is one of the core disciplines of the CCR. Its focus is in visual anthropology, and the anthropology of art, aesthetics and cross-cultural representation; in an interdisciplinary context which includes collaboration with historians, archaeologists, philosophers, linguists and filmmakers.

All three of the major contributors to anthropological research at the ANU also offer research training and each has a share in the total number of current Ph.D students in the field.

Both CAEPR and CRES conduct anthropological research as part of their interdisciplinary approach to indigenous issues and environmental research respectively.

Bibliometric Analysis
As in most social science and humanities disciplines, journals are not the most common mode for reporting human geography research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 21% of RSSS output, and just 6% of Faculty of Arts output, appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

Commentary
All assessors rated anthropology at the ANU extremely highly, with nearly three-quarters of the research assessed as "world-class". All three major areas of the ANU which conduct anthropological research rated well. That 40% of the work was regarded as "exceptionally significant" is an indication that all three areas also contain eminent and influential anthropologists in international terms – a conclusion supported by the assessors' comments.

It is significant that assessors identified and praised the different approaches taken in each of the areas – the breadth of anthropological expertise in the Faculty of

| **Number of pieces of work available for assessment:** | 600 |
| **Number of Assessors:** | 18 |
| **Number of staff with work submitted:** | 184 |
| **IAS** | 74 |
| **Faculties:** | 663 |
| **Centres** | 47 |
| **Number of Higher Degree research students (2004):** | 110 |
Arts (appropriate to an area with significant undergraduate teaching responsibilities); the regional focus and situation within a multi-disciplinary research school of anthropology at RSPAS; and the innovative and interdisciplinary approach to anthropology at the CCR.

The assessment of both CAEPR and CRES recognized the importance of the anthropological work to these Centres’ research in indigenous issues and environmental research. This theme continued to demography, where assessors observed the role of demography in supporting the core research of both NCEPH, in public health, and CAEPR, in indigenous policy work.

Demography was rated very highly. In sociology, assessors observed that the ANU makes an important contribution to the social sciences as a whole in Australia, both from the RSSS and the Faculty of Arts.
RESEARCH ASSESSMENT

VISUAL ARTS

**Major Contributors:** Work at the research level in the field of Visual Arts is conducted exclusively at the Faculty of Arts.

At this Faculty, the School of Art works in media such as Ceramics, Glass, Gold & Silversmithing, Painting, Photomedia, Printmedia and Drawing; Sculpture, Textiles, and Wood, amongst others. The Centre for New Media Arts, also within the Faculty of Arts, has contributed to research in the field of cinema and in applied digital arts, and devotes a significant portion of resources to undergraduate teaching.

With only a small number of visual art academics, and important teaching responsibilities, the Faculty of Arts has submitted no less than 64 important works to the review.

**Bibliometric Analysis**

As in most social science and humanities disciplines, journals are not the most common mode for reporting visual arts research. Even where journal outlets are used, only a small proportion are indexed by ISI e.g. only 21% of RSSS output, and just 6% of Faculty of Arts output, appears in ISI indexed journals. As a result, bibliometric analysis is inappropriate for this discipline.

**Commentary**

One assessor observed the inherent difficulties:

"As all research in this sub discipline largely entails the creation and presentation of works of art, assessors have only been able to assess the whole partially, as the art works are seen only in reproductions. Still, they furnish a fair impression. (one assessor commenting on the difficulty of evaluation research in this field). More significantly, the five works I have evaluated display conceptual and methodological rigour germane to the sub discipline and at commendable levels. This is extremely important in seeking to claim exemplariness and I recognise it [in the marks]."

<table>
<thead>
<tr>
<th>Quality of research:</th>
<th>Internationally excellent (World’s top 25%)</th>
<th>Exceptionally significant (World’s top 5%)</th>
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<tr>
<td>Number of Higher Degree research students (2004):</td>
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</table>
MANAGING THE RESEARCH INTERFACE

Beyond the primary functions of research and education, the ANU encourages a culture of innovation among its researchers and students, and actively protects and manages the intellectual property gained through it research.

The Deputy Vice-Chancellor (Research) leads and oversees the strategic development and management of intellectual property management and technology transfer on behalf of the University. The vehicle used by the University for the management of innovation, intellectual property, and commercialisation is ANU Innovation, a division of the ANU-owned company, ANU Enterprise Pty Ltd (prior to 2004 named ANUTECH Pty Ltd).

ANU Innovation’s purpose is to generate funds for research at the Australian National University. Apart from the direct financial benefits ANU Innovation provides considerable off-balance sheet and intangible benefits for the university through its activities.

ANU Policy Framework

The University has developed a number of policies to define ownership and provide procedures for the management of intellectual property, including the Intellectual Property: Ownership, Protection, and Commercialisation Policy (1298b/2002), the Policy on Applying for and Accepting Research Grants, Contracts, and Consultancies (680/2000), the Policy on Company Directorships, Secretariships, and partnerships (2002/03950), the policy on Conflict of Interest and/or Commitment (2003/01368), and the Guidelines for the Responsible Practice of Research. In addition ANU Innovation has developed with the University 'The Intellectual Property Manual', a practical guide for ANU staff encapsulating the content of the relevant policies and explaining the processes used in technology transfer and commercialisation.

University policies are regularly revised to ensure currency. The policies relating to innovation were revised in 2002, and the Intellectual Property Policy and Manual will be revised in 2004. There are now four policies relating to Intellectual Property and conflict of interest:

- Company Directors, Secretariships and Partnerships

- Conflict of Interest and Commitment.

- Intellectual Property: Ownership, Protection and Commercialisation

- Use of the ANU’s name and insignia
Collaboration and Partnerships

The ANU collaborates with researchers in universities throughout the world as well as with researchers in other Australian universities and research organisations such as the CSIRO.

The ANU’s Annual Report lists over 1200 research projects involving collaboration with researchers from other universities or research organisations around the World. In the IAS, the formal location within Schools of staff from other research organisations such as AGSO and Telecom was a precursor for the CRC concept. The ANU is partner in three major National Research Facilities.

Regional Collaboration

The ANU is committed to pursue research collaboration in regional Australia. Examples include collaboration with:

- AOFR Pty Ltd (Fyshwick ACT) including a project on the Design, Fabrication and Evaluation of Planar Lightwave Circuits in Organically Modified Silicate Glasses for Telecommunications and Other Applications;
- Australian Water Technology on Surface Characterisation of cryptosporidium oocysts and giardia cysts for the Development of Novel Filtration Systems for Commercial Applications;
- Charles Sturt University and the University of Melbourne in Applied Ethics;
- Charles Sturt University on Rootstock influence on the relationship between vine performance and grape quality;
- The Australian War Memorial;
- University of Canberra cell death in Ross-River virus-infected striated muscle is being conducted by JCSMR and another on Neuronal plasticity in the adult visual cortex.

Interaction with Industry and Commercialisation of Research

The ANU encourages research collaboration with industry. It has strong research links with a diverse range of companies, and continuously seeks to expand its industry linkages through participation in the Government’s Cooperative Research Centres (CRCs), Collaborative Research Grants and University-Industry Postgraduate Research Award Programs, launching of companies such as Acton Lasers, and attracting other companies such as BlueLab (Taiwan) to set up R&D laboratories on campus.

The ANU is a participant in the following CRCs and Centres of Excellence:

- Australian Photonics CRC
- CRC for Landscape Evolution and Mineral Exploration
- CRC for Pest Animal Control
- Greenhouse Accounting CRC
- Tropical Plant Protection CRC
- CRC for Functional Communication Surfaces
- CRC for Sustainable Production Forestry
- CRC for Smart Internet Technology
- CRC for Innovative Dairy Products (associate participant only)
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- National ICT Australia (NICTA)
- Centre of Excellence for Quantum-Atom Optics
- Centre of Excellence for Mathematical and Statistical Modelling of Complex Systems

Collaborative R&D projects with industry include:

- PI-88 and other oligosaccharides. The John Curtin School of Medical Research (JCSMR) with Progen Industries Ltd;
- Cell cycle genes. Research School of Biological Sciences (RSBS) with Crop Design NV;
- Collaborative chemical screening. Research School of Chemistry (RSC) with GlaxoSmithKline;
- Cotton fibres. RSBS with Aventis Crop Science and CSIRO;
- Insect Vision & Navigation. RSBS with the Office of Naval Research, USA;
- Seekers & Controllers. RSBS with the Office of Naval Research, USA;
- Epilift. Faculty of Engineering and Information Technology (FEIT) with Origin Energy Retail Ltd;
- Solar trough. FEIT with Solarhartz;
- Cellulose genes. RSBS with Groupe Limagrain / Biogemma;
- Phosphosugars. JCSMR with Praxis Pty Ltd; and
- Phytophthora - Novel Control Strategies. RSBS with Rhone-Polenc.

The ANU is also a member of:

- BIOZ, the Australian Bioscience Consortium;
- The Canberra Commercialisation Council;
- ATPI, the Australian Technology Park Innovations; and
- Epicorp, the Australian Capital Region's high technology commercialisation centre.

Cooperation with Government and other public institutions

The ANU encourages academic staff to give specialist advice and assistance to Federal and State Government departments and to other public institutions, both within Australia and internationally. This takes many forms - consultancies, membership of committees, involvement in particular projects, secondments, etc. The ANU's Annual Report for 2001 provides a list of over 500 academic staff involved in such activities. Highlights include:

- The Centre for Tax System Integrity is a research unit within the Research School of Social Sciences set up to extend understanding of how and why cooperation and contestation within the tax system occurs. The Centre has been set up in partnership with the Australian Taxation Office;
- The Australian Centre for Intellectual Property in Agriculture undertakes research in issues relating to intellectual property law, to apply it to the scientific community and industry and rural bodies, particularly in the agri-food sector. The Centre is funded by the Grains Research and Development Corporation and the Commonwealth Government;
- Senior ANU academics serve on a number of public and parliamentary advisory bodies.
• The Centre for Aboriginal Economic Policy Research (CAEPR) is a multi-disciplinary social sciences research centre with a primary focus on indigenous Australian economic policy and policy development issues, including native title and land rights, social justice and the socioeconomic status of indigenous Australians. The Centre is funded by the Aboriginal and Torres Strait Islander Commission (ATSIC), the Commonwealth Department of Family and Community Services and the ANU; and

• The Strategic and Defence Studies Centre aims to advance the study of strategic problems, especially those relating to East Asia and the Pacific. Participation in the Centre's activities is not limited to members of the ANU, but includes other interested professional, diplomatic and parliamentary groups including the Australian Defence Force.

Intellectual Property, Commercialisation and Contractual Arrangements

The ANU actively seeks to manage its intellectual property to maximise the return on investment in research and ensure the transfer of technology for public benefit. Overall responsibility for the management of intellectual property in the ANU rests with ANU Innovation and the Research Office. The Deputy Vice Chancellor (Research) has management responsibility.

Strategies for the identification, assessment and protection of IP

ANU Innovation manages the intellectual property protection and the commercialisation of University research and is charged with responsibility for raising research funds in addition to any that might flow from commercialization.

The company employs staff to work with ANU staff to understand their research areas and to identify opportunities that may have commercial potential and opportunities for commercial exploitation of their research.

When a project with commercial potential is identified, ANU-Innovation staff undertake an extensive review of patent and publication databases to determine whether the technology is patentable. They also undertake a review of the potential markets for the technology, identify any competing technologies and collating a list of potential commercial partners to be approached during marketing of the technology. Where a technology is complex and beyond the capabilities of the ANU-Innovation staff, external experts are contracted to undertake a review of the potential opportunity.

ANU-Innovation manages protection of intellectual property with the assistance of external patent lawyers. The company has one person whose responsibility is patent management and management of the databases relating to patents. ANU-innovation also manages the ANU’s portfolio of trademarks and other registered intellectual property. Determination of an appropriate commercialisation strategy is undertaken by ANU-Innovation staff in consultation with the researcher and Deputy Vice Chancellor (Research).

Equity holding Policy

The ANU holds equity in a number of start-up companies that have been formed to commercially exploit intellectual property arising from ANU research. The ANU Investment Office manages the equity obtained by the ANU through commercialisation. Researchers involved in the generation of the research may also hold equity in a company.

Strategies to interact with industry partners

Research staff are encouraged to liaise with industry partners in relation to their research in order to promote areas of common interest and a mechanism for marketing the ANU's
research capabilities. Staff are encouraged to apply for government supported linkage programs and the entry of the Institute of Advanced Studies into the ARC in 2001 resulted in a number of successful ARC Linkage Program grants being approved.

The ANU undertakes a number of collaborations with industry partners both nationally and internationally. As part of its marketing of ANU research to potential commercial partners ANU-Innovation holds regular meetings with potential investors and industry representatives to discuss technologies with potential commercial application.

ANU-Innovation is an integral part of an initiative between Unisearch (University of NSW), the Business Liaison Office (University of Sydney), University of Technology Sydney and the Australian Technology Park-Innovations called from Bench to Business. The aim of the initiative is to enable access for potential partners in industry and investment communities to new technologies by providing an opportunity for the commercial arms to showcase technologies to this audience.

**Ownership of Intellectual Property (IP)**

The ANU's policy on IP aims to protect the ANU's rights to IP generated at the ANU, having regard for the rights of staff and students and appropriate reward for creativity and endeavour. Under the policy, IP generated by staff in the course of their work is owned by the ANU. ANU does not claim ownership of copyright except under particular circumstances as set out in the policy. The ANU IP Policy requires that staff and students take appropriate steps to protect the ANU's IP.

Under the ANU IP policy students own IP generated by them in the course of their studies. In circumstances where the ANU may seek to commercially exploit intellectual property generated by students it will ask students to assign their IP to the ANU and the student will then be recognised under the distribution scheme for the sharing of financial benefits of commercial exploitation.

**Incentives to staff to encourage research commercialisation**

The ANU IP Policy contains provision for sharing of net income received as a result of commercialisation of research results.

**Summary of performance to date.**

ANU Innovation is responsible for identifying and recording new intellectual property developed by the ANU academic community. This process is facilitated by Technology Managers outposted to Research Schools, Centres and Faculties. This process produces between 10 and 30 new disclosures being registered per year.

**Patents**

The ANU Patent portfolio is managed by ANU Innovation and currently comprises 100 patent families (totaling 419 patents), including provisional and PCT applications, national patent applications and granted patents. Of these 100 families, 45 have industry partners.

The projected prosecution and renewal patent costs (where there is no commercial partner) for the year 2004 are $485,000. ANU Innovation has negotiated approximately 50 licences for access to patented IP (about 10 new licences per year on average), yielding roughly $500,000 per year.

**Start Up Companies**
ANU innovation has played a major role in the creation of a range of start up companies utilising intellectual property developed within the ANU. These are described below:

**Listed Companies:**

**Biotron Ltd**

Biotron Limited was incorporated in February 1999 to fund, manage and commercialise a number of existing biomedical projects resulting from research at the John Curtin School of Medical Research. ANU shareholding – 4,500,000 shares, listed on Australian stock exchange January 24, 2001

**Pi2 Ltd**

Pi2 focuses on the development of the molecule, PAI-2, for treatment of wound healing and skin disorders including chronic venous leg ulcers and psoriasis. Intellectual property derived from JCSMR. ANU shareholding – 850,000 shares, listed on Australian stock exchange January 28, 2000

**Praxis Pharmaceuticals Inc**

Praxis Pharmaceuticals focuses on the discovery, development and commercialisation of low molecular weight carbohydrate drugs for the treatment of inflammatory diseases and tissue injury. Intellectual property derived from JCSMR. ANU shareholding – 300,000 shares, listed on the US stock exchange (NASDAQ)

**Private Companies:**

**CropDesign NV**

CropDesign uses its broad applied genomics technology platform to develop wheat, rice and other cereals with higher yield, heightened tolerance to stress and diseases, and with improved qualities. Intellectual property derived from RSBS.

**Lipotek Pty Ltd**

Lipotek aims to develop drug delivery systems for human therapeutics and vaccines using targeted stealth liposome technology. Intellectual property derived from JCSMR & BaMBi. ANU shareholding – 20% equity, shareholders agreement executed May 2002

**Phenomix Corporation Inc**

Phenomix uses functional genomics to direct drug discovery for human health. Intellectual property derived from JCSMR. ANU shareholding – 725,000 shares

**Praxis Pharmaceuticals Pty Ltd**

Subsidiary of Praxis Pharmaceuticals Inc. Intellectual property derived from JCSMR. ANU shareholding – 2.5% equity

**Ringwood Superabrasives Pty Ltd**

Ringwood aims to develop a product line of diamond composite materials for drilling and other abrasive applications. Intellectual property derived from RSES. ANU shareholding – 83,568 shares, shareholders agreement executed April 2002

**Seeing Machines Pty Ltd**
Seeing Machines develops cutting-edge face and gaze tracking technology. Intellectual property derived from RSISE. ANU shareholding – 22.7% equity, Shareholders agreement executed 2000. Seeing Machines won a $3.5m Industry Research and Development Grant over 3 years from the AUSIndustry START Grant Program to help the company to commercialise FaceLAB, their fatigue-monitoring product for vehicles.

**Vaxine Pty Ltd**


**BioVax Pty Ltd**


**Iliad Pty Ltd**

Iliad develops compound therapeutics for cancer. Intellectual property derived from Faculty of Science, School of Chemistry. ANU shareholding 300,000 shares, License agreement executed 2003.

**Karley Technologies Pty Ltd**

Karley develops industrial chemistry. Intellectual property derived from Faculty of Science, School of Chemistry. ANU shareholding ...% equity, License agreement executed 2003.

**Value to the Australian National University**

The value of start up companies is highly variable. However, an independent valuation of the Value of Equity held by the ANU was $3.29m in 2000. No start up companies established by ANU have yet failed.

**New Directions**

Past attempts to raise revenue have focussed on a broad range of activities including development assistance consultancies. In 2004, ANU Innovation has refocussed its activities on providing value to the University through collaborative projects with university staff, partnerships with a range of external organisations, and improving its technology transfer processes. This will result in a short term reduction in income while staff shift and retrain, but will be both more sustainable in the longer term and reflect better the values of the University.
ATTACHMENT A

THE PROCESS OF EVALUATING THE QUALITY OF RESEARCH: PEER ASSESSMENT AND BIBLIOGRAPHIC ANALYSIS.

Peer Assessment

At heart of the peer assessment process is an assessor of international standing making a judgement about the quality of the ANU’s most influential research outputs relative to world’s best publications in their field of expertise.

Initial steps in this process involved classifying the ANU’s best publications within recognised disciplines and appointing assessors accordingly. To allow for aggregation of assessments relative to the outputs of academic organisational units within the university, context statements, in addition to collections of best publications, were created for each assessor.

Specifically, each Dean or Director (of each Faculty, School and Centre) prepared a ‘context statement’ for their particular area of responsibility. The statement outlined the research interests and orientations of the area, along with comments on the research performance of the area and factors affecting performance.

These context statements also included self-assessments on a five-point rating scale (the same scale used for ratings by external assessors - see below) for the best outputs of each of the disciplines to which their area contributed.

The Context Statements were attached to the research publications to form the information package made available to external assessors.

Research works assessed were selected from those of all research-active staff across all levels of academic appointment, including research-only and teaching-and-research staff, except for relatively junior staff in some academic areas. The level of the academic appointment of each of researchers was made clear in assessors information package.

This process resulted in the work of 1350 academic staff (approximately 90%) being submitted for assessment. Deans and Directors commented in their context statements, as appropriate, on different expectations of the research output of early career researchers and senior researchers.

Each researcher identified up to five of their ‘best’ research works published or exhibited over the period 1995-2003. This resulted in approximately 6000 pieces of work being submitted to 320 assessors. Assessors were given access to most of these works through an on-line repository, and could access all by request for couriered CD versions or hard copies. Also a full list of the research outputs in the period 1995-2003 of each of the 1350 researchers was made available.

The peer assessment process operated at a ‘sub-discipline level’ to allow for specialised areas of expertise. Distinguished assessors were appointed to cover the range of sub-disciplines identified as characterising ANU’s research. Assessors were asked to sample from, and rate, the outputs of the researchers in the discipline areas referred to them, taking into account any other work in list of published works if they wished to do so.

Nominations for assessors were sought from each Faculty, School and Centre for each of the sub-disciplines in which they are active. Nominees were selected on the basis of their international esteem in the field, with the restriction that they should not have published with ANU researchers over a significant period. Also adjunct appointees and Visiting Fellows were not to be appointed if their work was submitted for review. These rules did not exclude people who had familiarity with the ANU on the grounds that any university operating at a
suitably high level of quality should be well known within the world’s academic community. The number of assessors for a discipline area was determined on a maximum ratio of 50:1 works per assessor.

It should be noted that the exercise was not an overall evaluation of the totality of research outputs, but rather an attempt to capture the highest level of research quality attained by each of the research areas at the ANU, and measure this level of quality in terms of international standing.\footnote{A useful conceptual analogy might be afforded by the ranking of world-class athletes. Quality is measured by the (five) personal-best times or performances rather than an aggregation or averaging of all performances.}

Accordingly each assessor was provided with the work from all academic areas of the ANU conducting research in the sub-discipline of the assessor’s expertise. There was no assignment of particular works to particular assessors. Assessors were asked to give a separate rating for each ANU Faculty, Research School or Centre, and to rank the ANU for its overall standing in the sub-discipline.

Assessors were given access to all works in their sub-discipline and asked to sample across AOUs to their satisfaction in providing a rating for each AOU using the scale in the table below. Assessors were also asked to rate the quality of research output in their sub-discipline in each of the organisational areas of the University active in that sub-discipline.

At the time of writing approximately 285 assessors have submitted assessments, 85% of whom are from institutions outside Australia.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Centiles</th>
<th>Descriptor</th>
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</thead>
<tbody>
<tr>
<td>W</td>
<td>96-100</td>
<td>Exceptionally significant. Research that falls within the top 5% of all research in its sub-discipline internationally, or makes an equivalently exceptional contribution to research in an area of particular significance to Australia.</td>
</tr>
<tr>
<td>I</td>
<td>76-95</td>
<td>Internationally excellent. Research that falls within the top 25% of its sub-discipline internationally, or makes an equivalently excellent contribution to research in an area of particular significance to Australia, (but that does not fall within the top 5%)</td>
</tr>
<tr>
<td>H</td>
<td>51-75</td>
<td>High quality. Research that is of higher than average quality compared to all research in its sub-discipline internationally, but not in the top 25%</td>
</tr>
<tr>
<td>A</td>
<td>21-50</td>
<td>Acceptable. Research of lower than average quality compared to all research in the sub-discipline internationally, but not in the bottom 20%</td>
</tr>
<tr>
<td>P</td>
<td>1-20</td>
<td>Poor quality. Research output in the bottom 20% of its sub-discipline internationally</td>
</tr>
</tbody>
</table>

Assessments were received for 102 out of 111 original sub-disciplines. The ratings distributions of assessors were statistically aggregated by Faculty, School and Centre and by Discipline.

A matrix was constructed that allowed the performance (giving the proportion of publications in the Top 5% and Top 25% categories) of each ‘sub-discipline’ in each AOU to be charted. The different steps used for obtaining the final values are described below.

For each AOU within a sub-discipline, the values given by each assessor for the Top 5% and Top 25% ratings were averaged, while the “Not Rated” returns were disregarded. If an AOU
was not rated by any of the assessors, the publications provided by that AOU in that sub-discipline were removed.

The assessments were used at the level of the ‘sub-discipline’ or they could be aggregated up to the level of the discipline or the AOU. For example: inorganic chemistry – chemical sciences – faculty or school

To get an overall rating, the data calculated for each area within an AOU needed to be statistically merged. Three different methods were used and compared.

- All papers and sub-disciplines counted equally (Unmodified Method)

The formula used to calculate the overall rating for a sub-discipline that involved more than one AOU, was:

\[
\text{Overall Rating} = \frac{A_{\text{rating}} \times A_{\text{papers}} + B_{\text{rating}} \times B_{\text{papers}}}{A_{\text{papers}} + B_{\text{papers}}}
\]

For example, if Faculty A submitted 10 papers and was rated 60% in the Top 25 category, while Faculty B submitted 45 papers and was rated 55% in the Top 25, the overall Top 25 rating for the sub-discipline would be \((60\times10 + 55\times45)/(10+45) = 55.9\) (=> 56% overall rating).

The same method was used to obtain amalgamated ratings for individual AOU from their multiple sub-disciplines ratings. The rating for each sub-discipline was multiplied by the number of papers submitted by the AOU, and then divided by the total number of works submitted by that AOU.

The values discussed in this report were primarily obtained using this method.

- Number of Papers Modified According to their Number of Appearances

When papers were submitted several times to different sub-disciplines, calculations were carried out to modify the impact of each paper according to its number of appearances (eg each paper submitted twice would be valued at 0.5 in the amalgamation calculations, each paper appearing 3 times 0.333).

This method was developed so that papers submitted several times by one AOU would not have greater impact on the overall ratings of that AOU than single submissions. Although this way of counting shows great differences in the submission numbers (eg. RSPAS having a total of 988 entries assessed within the sub-disciplines, the submissions represent only 460.333 papers as calculated by Method B), the overall values obtained for the sub-disciplines/disciplines/AOUs, using the same formula as above with modified numbers for the papers, showed only minor variations.

- Papers Modified for Appearances and Ratings Weighted According to the Number of Assessors

Ratings based on multiple assessors should have a greater statistical impact than those based on single assessments, especially when merging the sub-discipline ratings into disciplines. For this purpose, the formula was modified to include the number of assessors having given a rating to this AOU (in this sub-discipline), AOU_Assessors Number:

\[
\text{Adjusted Rating} = \frac{A_{\text{rating}} \times A_{\text{papers}} \times A_{\text{AssessorsNumber}} + B_{\text{rating}} \times B_{\text{papers}} \times B_{\text{AssessorsNumber}}}{A_{\text{papers}} \times A_{\text{AssessorsNumber}} + B_{\text{papers}} \times B_{\text{Assessors Number}}}
\]
The results obtained for the disciplines show that the 3 methods give very similar values, the biggest variation being observed for Philosophy where the unmodified Top 25% value of 62.1% is increased by 9.6% (to 71.7%) and Asian and Pacific Studies (28.1%) which decreases to 26.4% when Method C is applied.

The discipline ratings used for this report are summarised in Table 3 (presented earlier in this chapter), giving the overall Top 5% and Top 25% for the ANU submissions within the different disciplines but also the breakdown of the ratings into the three main university components (the Faculties, the Institute of Advanced Studies and the Centres).

Each assessor provided a ranking of the ANU as a whole in their sub-discipline within a certain range, eg in Top 25 universities (any position between 1 and 25) or in Top 50 universities (any position between 26 and 50). These rankings were not weighted but simply summed over the sub-disciplines forming a discipline and tabulated in the report for the corresponding discipline.

While the overwhelming majority of assessors had no difficulties, and many said they found the process interesting and informative, some assessors were uncomfortable with the exercise. Some placed strong caveats on their numerical ratings and rankings. A couple challenged the very validity of the exercise. A few were critical of the processes for accessing materials given the relatively short time-lines; others were complimentary about the processes. Several made suggestions for improvement.

Whereas the UK RAE has defined criteria for each category of assessment, the approach adopted here relied on assessors’ own judgements of what constitutes ‘world class’ research. Interestingly, none of the assessors requested an ANU definition of ‘world class’; presumably they knew it when they saw it. Several assessors indicated the criteria they used; many relied on the status of journals and the reputation of researchers, along with indicators of the volume and recent timing of output. Many assessors referred to the context statements and self assessments; several commented how useful they found them.

**Bibliometric analysis**

A detailed bibliometric analysis of ANU research was prepared by the Research Evaluation and Policy Project (REPP) to inform the ANU Quality Review. This is an ideal setting in which to deploy bibliometrics as the analyses can be interpreted alongside other assessment procedures, such as peer review.

REPP maintains a database of all Australian publications in the three main indices of the Institute for Scientific Information (ISI). It is able to disaggregate its analysis below the institutional level because it ‘cleans’ all addresses in its database, allocating each one a standardised address.

The methodology used is described in full in the detailed document that was provided to reviewers. Briefly, the main features are:

- It is limited to publications in journals indexed by ISI;
- ANU publications are identified from the addresses in the database;
- The analysis is primarily focussed on the five year period 1998-2002, though with one time series chart;
- The analysis covers all journal output for the period, not just those included in academics’ starred items, which were the basis of the peer assessment;
- Research disciplines are delineated by journal sets aligned to the Research Fields, Courses and Disciplines (RFCD) classification scheme. These do not always align with ‘fields’ as they were constituted for the ANU Quality Review; and
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- Analysis is limited to units with at least 100 publications – this overcomes many of the distorting factors inherent in citation data, but limits the number of disciplines and areas that can be analysed.

Research disciplines vary in the extent to which journal publication can be regarded as the normal mode of research dissemination, and the extent to which journals in the discipline are covered by ISI indexing. The accompanying table demonstrates this for major areas of the ANU.

The full analysis presents 5 different citation measures for each field and sub-field analysed:

1. Citations per publication – the average for publications appearing between 1998 and 2002 and the citations they received in the same period;
2. Citations per publication time series – overlapping five year windows from 1981-85 to 1998-02;
3. Highly cited publications – the location of the 1% and 5% most highly cited Australian publications in the discipline;
4. Journal impact quartiles – journals are divided into 4 equal groups based on their impact, and publications are then distributed across these four quartiles; and
5. Actual versus expected citation rates – comparison of actual citations achieved to the level expected for the same types of publications appearing in the same journals in the same years.

The review committee had access to the full analysis, however the restrictive license with ISI under which REPP obtains the data precludes it from publishing details on any other institution. In consequence, analyses presented in this public document show only ANU data, and comparative figures for the world, Australia, and the ‘Group of Eight’ universities (Go8) in aggregate. In addition, the level of detail presented in this document is necessarily restricted in scope, and only the first two measures are included. These are explained here in more detail, using data for all publications to illustrate the measures.

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<td>Go8</td>
<td>53460</td>
<td>4.71</td>
<td>1.09</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>97131</td>
<td>4.47</td>
<td>1.03</td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>3454179</td>
<td>4.33</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

The ANU’s citation per publication rate (cpp) is calculated and compared to the world average (relative impact). The same calculation is also done for the Go8 institutions and Australia in aggregate. In the field analyses, the ANU figure is disaggregated by area. This has not been done for total publications as citation practices are field specific, and it is not legitimate to directly...
compare areas of the university. In aggregate, the ANU's cpp rate is 34% above the world level.

The second measure shows citation rates over time, for four levels of aggregation. The ANU's aggregate citation rate has been well above the world level across the full period covered by the REPP analysis. It has shown a particularly marked increase in the last decade.

Certain data included herein are derived from the Australian National Citation Report prepared by the Institute for Scientific Information®, Inc. (ISI®), Philadelphia, Pennsylvania, USA: © Copyright Institute for Scientific Information® 2002. All rights reserved.
CHAPTER 3: THE QUALITY OF RESEARCH TRAINING

Summary

- The ANU is committed to maximising its contribution to high quality research student education under the Australian Research Training Scheme (RTS) and for international students (HDR student numbers at ANU have increased from 1305 to 1697 since 2000).

- The ANU's individual Research Schools, Faculties, and University Centres provide quality research education for research students, with supervisory panels of at least three staff for each doctoral student to ensure access to research expertise University-wide and in related national institutions and research organisations in Canberra.

- The ANU provides unique, University-wide complementary programs for research students through the Graduate School, the Academic Skills and Learning Centre, the Division of Information and other central areas (e.g. the Statistical Consulting Unit, the Graduate Teaching Program, the Graduate Information Literacy Program, the Academic and Professional Skills Program).

- The ANU's PhD cohort study (2001) found that over 80% of ANU doctoral students successfully completed the degree, the highest PhD completion rate reported by Deans and Directors of Graduate Schools in Australia.

- The ANU's doctoral students recognise the high quality of the research experience at ANU (2004 PhD Focus Groups, 2004 Alumni survey, ANUDEQ 2000-2003), with the highest ratings among the Go8 research-intensive Universities for intellectual climate, infrastructure, and thesis examination (PREQ 1999-2003).

- The ANU is committed to improving staff development for research degree supervisors with an expanded program of research supervision workshops for experienced supervisors; and to improving completion times for research students through more rigorous planning and feedback.
Introduction

The role of the ANU in research training is significant and growing, with about 1700 research students presently enrolled. When the university was established – essentially as what is now the Institute of Advanced Studies (IAS) - the designated role was to conduct research of the highest order and research training, since that was not a feature of Australian universities at that time. It is now a characteristic of all universities, although the unique position of the ANU gives it a continuing and major responsibility for research training.

By virtue of its scale, its structure, the spread of disciplines and its special funding for research, all parts of the ANU have a responsibility to train a significant number of the next generation of researchers. The university has set a growth target of an additional 100 research student EFTSU p.a. since 2002, with an expanded scholarship program to attract first class Honours applicants. Research training is a University-wide endeavour – over half the University's doctoral candidates are enrolled in the Faculties and increasing numbers in the IAS.

Research Degrees

Research student (HDR) training at the ANU is delivered primarily through the Doctor of Philosophy (PhD) and Master of Philosophy (MPhil) degrees. While primarily research, these degrees may include some coursework as a program requirement (e.g. in Economics and Psychology), or as an individual student requirement specified by the supervisory panel.

Students enrolled for a research degree are located in a School, Faculty or University Centre according to the location of the principal supervisor; and also access support through the University-wide Graduate School, the Academic Skills and Learning Centre and other central areas.

The PhD degree enrolment is for four years full-time, with provision to submit after completion of enrolment. Each student has a supervisory panel of at least three people, one or more of whom must be a member of the University's academic staff. Supervision arrangements for PhD candidates are negotiated on an individual basis and must be approved, in conjunction with a suitable study program, by the Director or Dean.

For the degree of PhD, candidates are normally required to submit a thesis of not more than 100,000 words. The thesis must make a substantial contribution to learning and demonstrate a capacity to relate the research done by the candidate to the broader framework of the discipline or disciplines within which it falls, at the standard internationally recognised for the degree in the relevant discipline or disciplines.

The MPhil degree enrolment is for two years full-time. Supervision arrangements for MPhil candidates are negotiated on an individual basis and must be approved, in conjunction with a suitable study program, by the Director or Dean. A minimum of one University supervisor is required.

Preliminary research training, or preparation for a research degree, is provided at the undergraduate level, principally in the Honours program (described below).

The University has recently (2004) introduced a "Code of Practice for Supervision in Higher Degrees by Research", the purpose of which is to make explicit the detailed expectations and responsibilities of both staff and students (to each other).
Student Selection And Profile

Admission to a research degree requires at a minimum an undergraduate Honours degree (at Honours 1 or 2A level), or prior studies that include evidence of equivalent research work.

Research scholarships normally require a first class Honours degree, and only first class Honours applicants are ranked for APA and University central scholarships. Seventy five per cent of doctoral students held a scholarship in 2003.

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD</td>
<td>1060.5</td>
<td>1075.9</td>
<td>1117.5</td>
<td>1278.9</td>
</tr>
<tr>
<td>MPhil / Master (Research)</td>
<td>92.6</td>
<td>66.5</td>
<td>66.7</td>
<td>68.0</td>
</tr>
</tbody>
</table>

Table 1: ANU Higher Degree by Research students (EFTSU) 2000-03

The PhD/MPhil profile of HDR students at the ANU is shown in Table 1 (in EFTSU). The Table below (2) shows the numbers of male and female students by program for 2003.

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
<th>% Female</th>
<th>% Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctorate by Research</td>
<td>700</td>
<td>889</td>
<td>1589</td>
<td>44.1</td>
<td>55.9</td>
</tr>
<tr>
<td>Master's by Research</td>
<td>39</td>
<td>69</td>
<td>108</td>
<td>36.1</td>
<td>63.9</td>
</tr>
<tr>
<td>Total</td>
<td>739</td>
<td>958</td>
<td>1697</td>
<td>43.5</td>
<td>56.5</td>
</tr>
</tbody>
</table>

Table 2: Male/Female student enrolments 2003

Research Training Environment

Schools, Faculties and Centres
The research training environment in individual Schools, Faculties and Centres of the ANU provides the home base for research students; and is complemented by a University-wide Graduate School with some unique programs as well as support from other central areas like the Academic Skills and Learning Centre (ASLC) and the Division of Information (DOI).

The ANU system of supervisory panels provides students with access to research expertise wherever it is located, on or off campus (e.g. co-supervision with staff from CSIRO Black Mountain or other research laboratories). This is especially important for interdisciplinary and multidisciplinary research topics, where a single supervisor and department model does not provide full coverage of relevant fields.

The ANU, located in the national capital, is able to extend the options available to its research students by collaboration with the wide variety of national institutions located in Canberra as well as between areas within the ANU. These collaborations allow internships and co-supervision or specialised course-work where it is in the interests of the student. For example: all economics graduate students – wherever they are located in the university – share a common first-year experience of coursework that gets all ”up to speed”, as well as best utilising the campus-wide resources in Economics as a whole; the Biochemistry and Molecular Biology program is unique in that it covers 7-8 institutions around Canberra which interact or collaborate in various ways; astronomy students take a first year program because many come in with strong physics and mathematics background, but not much astronomy; art history, curatorship and film studies students take internships where a candidate is placed within a national art institution for a year and undergoes a carefully designed system of training and assessment.
The Graduate School
The role of the Graduate School is to oversee graduate education, and to provide coordination and support services for graduate students and academic staff across the University. It also provides induction workshops for research students, statistical consulting services and, jointly with the Academic Skills and Learning Centre, an academic and professional skills program. The Dean of the Graduate School exercises delegations from the Deputy Vice-Chancellor (Education) for a range of individual research student matters.

The Centre for Educational Development and Academic Methods (CEDAM) and the Graduate School jointly run training sessions on research supervision for academic staff, which are being significantly expanded (for experienced as well as inexperienced supervisors) from second semester 2004. These include:

- The Statistical Consulting Unit (SCU) has no identical equivalent at other university campuses. The SCU provides statistical consulting support as collaborators and supervisors for research students and staff across the university; and short courses in statistics to raise awareness of modern statistical practice. These courses aim to enable students to make more effective use of statistical consultants, thus enhancing the SCU professional advice provided in individual consultations. The number of individual clients is 180-190 per year (180 clients in 2001, 192 in 2002, 186 in 2003). The source of clients in 2003 was 66% from the Faculties and 34% from the Institute of Advanced Studies. The majority of consultations lead to follow-up analyses. In 2003 the SCU offered 8 short courses covering a wide range of statistical topics for 211 participants.

- The Graduate Teaching Program (GTP) has no equivalent at other Australian Universities. The GTP is a semester program of teaching support and development for PhD students and Postdoctoral Fellows as tutors and demonstrators at the ANU, leading to the award of a GTP certificate. Run by the Graduate School GTP Convenor, the GTP draws on the expertise of staff from across the campus. The capacity of the GTP was increased by 50% from 2003, and it caters for up to 90 places. Participants have a part-time teaching post, with Graduate School sponsorship of students from the IAS in particular. Participant satisfaction with the GTP is high. Between 1995 and 2003, recommendations of the GTP by participants to other students average over 99%.

- The Graduate Information Literacy Program (GILP) has no equivalent at other Australian Universities. GILP is a collaboration with the Division of Information, and offers a Graduate Course Award in Research Information Literacy to graduate research students. Students complete modules and receive a certificate on satisfactory completion of an appropriate set. The coursework includes Information Searching, Information Management and Information Technology, as well as an advanced Literature Review Project that demonstrates proficiency in information literacy and a Research Sources Consultation. Specific programs are tailored for specific areas of the university.

- The Academic and Professional Skills Program (APSP), in collaboration with Academic Skills Learning Centre (ASLC), provides short courses and workshops on core academic and professional skills’ training needs of graduate research students across the University, and continues to expand. New workshops have included Intellectual Property Management, Commercialisation, Project Management and Introduction to Management. The APSP was used as one of two Go8 case studies, with the University of Melbourne, in the recent DEST report on “Postgraduate Research Students and Generic Capabilities”.

Doctor of Philosophy
PhD Cohort Studies
In 2000 a PhD cohort study analysed completions of students who commenced their PhD at the ANU between 1980 and 1990. The study found that an average of 80.3% completed the doctorate by 2000, the highest PhD completion rate reported by Deans and Directors of Graduate Schools in Australia. The ten year gap between admission and analysis makes allowance for part-time students.
Over 82% of commencing students under the age of 30 years completed the PhD; compared with 78% of the 30-39 age group and 67% for the 40-49 age group. Part-time enrolment reduced the completion rate. (The 2000 study is available on request).

In 2001 the University conducted a further analysis of the outcomes for annual cohorts of commencing PhD students from 1985 to 1992.

Some noteworthy features of this analysis include:

- Over 80% of ANU PhD students successfully completed their degree – the highest PhD completion rate reported by Deans and Directors of Graduate Schools/Studies. This contrasts with the DETYA analysis (Postgraduate Completions Rates - http://www.deet.gov.au/highered/occpaper/01d/01d.pdf) of part of the 1992 cohort for all Australian universities which estimated an eventual outcome of 65%.

- The completion rate varies between areas, with higher rates for science compared with non-science.

- Average completion rates for these cohorts were 86% in the IAS and 74% in The Faculties. This difference is partly due to the higher concentration of science in the IAS.

An updated cohort study is underway but will not be completed in time for this Review. The 1992 study is available on request.

**A retrospective study of HDR completers in 2002-2003.**

A retrospective analysis of those HDR students who completed in 2002-2003 showed that 432 students completed doctorates and 54 completed Masters by Research in those years.

In the IAS, with 238 completers, the average number of years to submission for a doctorate is 4.3 years, exactly the same as in the Faculties, with 162 completers. (This is a reduction from 4.5 years in the 2000 study above). The average time for the doctoral thesis examination process is 0.62 of a year - a reduction from .75 of a year in the 2000 study (See Table 3).

The University is working to reduce the average time to submission further, e.g. by more rigorous planning requirements for students and panels, especially in the first year of study; and to reduce the average examination time, e.g. by quicker responses to examiner’s reports.

<table>
<thead>
<tr>
<th>Area</th>
<th>Program Level</th>
<th>Number of Completions</th>
<th>Average Years to Submission (a)</th>
<th>Average Thesis Exam (Years) (b)</th>
<th>Average Years to Approval (a + b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAS</td>
<td>Doctorate</td>
<td>238</td>
<td>4.3</td>
<td>0.61</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>Masters</td>
<td>12</td>
<td>2.6</td>
<td>0.59</td>
<td>3.2</td>
</tr>
<tr>
<td>Faculties</td>
<td>Doctorate</td>
<td>162</td>
<td>4.3</td>
<td>0.63</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>Masters</td>
<td>42</td>
<td>2.3</td>
<td>1.00</td>
<td>3.3</td>
</tr>
<tr>
<td>ANU Total</td>
<td>Doctorate</td>
<td>432</td>
<td>4.3</td>
<td>0.61</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>Masters</td>
<td>54</td>
<td>2.4</td>
<td>0.91</td>
<td>3.3</td>
</tr>
</tbody>
</table>

**Table 3: Retrospective HDR completions study: 2002-2003**

**Graduate Destinations**

Employment outcomes are available from the national Graduate Destination Survey (GDS) conducted annually by the Graduate Careers Council of Australia. The survey provides data on employment, salary and general labour market trends for graduates approximately four months after the completion of their qualification. Highlights include:

- Doctor of Philosophy: The response rate at ANU in 2003 was 115 or 60%. PhD graduates earned an average of $53,675 per annum. Of these, 80% were employed full time, and 8% were unemployed. The majority (57%) were employed in Higher Education, and particularly as Postdoctoral Fellows and Research Fellows.
Master of Philosophy: In 2003, 13 Masters by Research graduate respondents earned on average $55,100. With so few respondents, it is not possible to make useful comparisons with other areas. However, 50% of those employed were employed in business services.

**PhD Student Examination**

A study was undertaken to collate the names and affiliations of all examiners for PhD candidates who were admitted to the award in 2003. Half of the 585 examiners used in 2003 were international (N= 294, or 50%), while 40% (N = 237) were from elsewhere in Australia, and the remaining 10% were from the ACT.

Examiners of PhD theses are invited to award a P (for pass), and AM or an A grade (pass after an amendment to the thesis to the satisfaction of the Head of Department) or a Fail. The ANU requires an oral examination where any examiner has concerns about the quality of the thesis, The oral examination enables examiners to clarify questions about the thesis directly with the candidate, and to determine the required amendments.

- In 2003 there 398 P grades; 329 A or AM grades; and there were no Fails.
- Since 1996, there have been 2700 HDR submissions. The Fail percentage is .002% (N=8).

**Student Satisfaction**

The Dean of the Graduate School regularly interviews students upon completion of the PhD. The table below shows the results of interviews from 1999 to 2003. Altogether, 16% of the total completions, or 146 people, drawn equally from the Research Schools and Faculties, were interviewed about their overall satisfaction; the quality of the infrastructure; and the quality of supervision over this period. On a scale of 1-6, high ratings between excellent and good were obtained on the overall satisfaction question (1.9) and on the infrastructure question (1.7), and responses to the quality of supervision question averaged a rating of good (2.1). Confidential in depth interviews were also conducted with these graduates as a source for policy recommendations for improvement.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision</td>
<td>1.8</td>
<td>1.9</td>
<td>2.4</td>
<td>2.1</td>
<td>2.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>1.7</td>
<td>1.7</td>
<td>1.8</td>
<td>1.6</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Overall Satisfaction</td>
<td>1.7</td>
<td>1.9</td>
<td>2.1</td>
<td>1.9</td>
<td>1.8</td>
<td>1.9</td>
</tr>
</tbody>
</table>

**Quality of Supervision (Scale of 1 to 6):**
1: excellent; 2, good; 3, satisfactory; 4, less than satisfactory; 5, bad; 6, disastrous.

Table 4. The Graduate School’s Exit Interviews

Postgraduate Research Experience Questionnaire (PREQ) benchmarks against national and Go8 universities for 2002 data only. The PREQ is sent out in conjunction with the Graduate Destination Survey to those PhD and MPhil graduates completing their qualifications within the preceding calendar year. Its objective is to collect graduates’ perceptions of their higher education experience. The questionnaire comprises six scales and one overall satisfaction item, relating to supervision, skill development, intellectual climate, infrastructure & thesis examination.

- ANU graduates agree that the intellectual climate and the infrastructure is significantly better than average.
- Their experience of supervision and their overall satisfaction, though still high, is close to the national average and high compared with the Go8.
- ANU graduates came out the most satisfied of the Go8 on 9/28 questions on the PREQ.
Table 5. PREQ broad agreement percentages: ANU and national

Source: PREQ 2002, Graduate Council of Australia

<table>
<thead>
<tr>
<th></th>
<th>Supervision</th>
<th>Skill Development</th>
<th>Intellectual Climate</th>
<th>Infrastructure</th>
<th>Thesis Examination</th>
<th>Clarity of Expectations</th>
<th>Overall Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Agree</td>
<td>ANU National</td>
<td>National</td>
<td>ANU National</td>
<td>National</td>
<td>ANU National</td>
<td>ANU National</td>
<td>ANU National</td>
</tr>
<tr>
<td>1999/00</td>
<td>61.9</td>
<td>69</td>
<td>87</td>
<td>90</td>
<td>64</td>
<td>55</td>
<td>76</td>
</tr>
<tr>
<td>2000/01</td>
<td>68.2</td>
<td>71</td>
<td>88</td>
<td>90</td>
<td>64</td>
<td>56</td>
<td>79</td>
</tr>
<tr>
<td>2002</td>
<td>71.5</td>
<td>71</td>
<td>91</td>
<td>89</td>
<td>65</td>
<td>55</td>
<td>76</td>
</tr>
<tr>
<td>2003</td>
<td>70.5</td>
<td>73</td>
<td>91</td>
<td>90</td>
<td>60</td>
<td>56</td>
<td>80</td>
</tr>
</tbody>
</table>

The ANU respondents (N=125) – 112 of whom were PhD graduates - responded to questions forming the following scales:

- **Supervision Scale**: Broad agreement on this scale has improved to 70.5% in 2003, from 61.9% in 1999. These percentages are at or below the national average. ANU sits right on the average for the Go8 universities with respect to this scale.

- **Skill Development Scale**: High levels of agreement (90%) have been maintained since 1999, and these are around the national average and the Go8 average.

- **Intellectual Climate Scale**: ANU graduates have scored significantly above the national average in each year (particularly 1999-2002 when they were 8.5 points above), with an agreement of 60% in 2003, which is 3.7% above. When compared with the 2002 Go8 universities, ANU has the highest average agreement with the 5 questions on the scale.

- **Infrastructure Scale**: Significantly higher than average agreement rates at ANU (79.7% in 2003), which is 12.5% above the national rate, continuing a pattern since 1999. On 3 of the 5 questions forming this scale, ANU scores highest of the Go8s.

- **Thesis Examination Scale**: Agreement at ANU is 78.6% compared to a national average of 75%, continuing a moderate above average trend. ANU has the highest score of the Go8 universities on this scale. Students are especially satisfied with the thesis examination process.

- **Clarity of Expectations Scale**: At 90% agreement, the ANU has consistently been at the level of the national average. When compared to the Go8, ANU is also close to average.

- **Overall Satisfaction**: Agreement on this scale for ANU is 82%, a slight drop for 1999 and 2000. All scores are at the level of the national average. Among the Go8 2002 data, ANU has the second highest overall satisfaction score.

The ANU Doctoral Experience Questionnaire 2000-2003 (ANUDEQ) is an internal doctoral questionnaire designed to complement the PREQ - which is conducted externally. ANUDEQ uses different items to the PREQ because ANU provides research training in a different way to many other Australian universities. One key difference is the use of supervisory panels rather than individual supervisors. ANUDEQ also uses more specific questions that can be used to provide feedback to the University on areas for improvement in its postgraduate research programs.

From the ANUDEQ data, the responses from 2000 to 2003 have been pooled (N=191). Although the same items are not used in ANUDEQ and PREQ, quite a number of the same “subscales” have been measured. When compared with the PREQ, the ANUDEQ results are very similar.
In summary:

- The great majority of students assessed their research higher degree experience at ANU to be enjoyable and of high quality.
- Social Sciences and Arts students tended to ‘strongly agree’ with this view, whereas Science, Health and Engineering students tended to ‘agree’.
- The ANU data confirms:
  - Above average on university infrastructure and intellectual climate
  - Average to below average on supervision

In 2004 the present cohort of PhD students was surveyed in order to assess whether the changes made in the university’s expectations for the HDR experience were beginning to take effect. Independent consultants conducted focus group surveys. Two groups of PhD students were recruited on a random selection basis from the Faculties and Research Schools and Centres at the ANU with the largest representation of research students: Arts, Science, the Research School of Pacific and Asian Studies, and the Research School of Social Sciences.

The consultants’ report states:

- Most PhD students believe that they are personally receiving a high quality research experience at the ANU. Similar to undergraduate and Masters students, they feel that the quality of their experience exceeds what they would have received at another Australian university.

- The main reasons for PhD students’ satisfaction relate to supervision, their departments’ research environment and resources. Those highly satisfied report having supervisors who are accessible and interested, and who take an appropriate mentoring role. They also report being in a department with a strong research culture. And, as mentioned previously, many PhD students feel that considerable resources are available to them, including equipment, support services or research funding.

- While most PhD students are happy with these aspects, a small minority feels that the quality of their research experience is not meeting their expectations. Their main issues relate to perceptions of insufficient supervisor interest or insufficient interaction within the research department.

- Overall, however, PhD students are the group most likely to appreciate the quality research culture and focus of the ANU, the ANU’s international reputation and quality of its academic staff, and the resources available to them. And these issues not only influenced their decisions to undertake a postgraduate research degree at the ANU but also contribute significantly to their level of satisfaction with the quality of their current experience at the ANU.

Two surveys were conducted in 2004, interviewing domestic and international alumni.

- Of the 379 respondents to the domestic survey, 15.5% were PhD graduates. A large proportion (32%) of respondents were recent graduates of the ANU (i.e. between 2000-2004), while over 16% of respondents had graduated prior to 1980.
  - Overall, domestic PhD graduates were the group most satisfied with many aspects of the ANU. Highest ratings of overall ANU education experience and the academic quality of the ANU were reported by PhD graduands. They also indicated greater satisfaction with the professional rewards they have received due to their university studies, greater vocational preparation, and greater graduate skills than the other groups.

- Of the 46 international PhD respondents the ratings were not so favourable.
  - PhD students were the least satisfied with course quality than those enrolled in other levels of education. This may be due to the fact that the international alumni graduated several years before the domestic. Larger percentages of these graduates completed their studies prior to 1980 (20%), and there were fewer (20%) graduates from the 2000-2004 period in the international alumni sample.

The details of these surveys are included at Appendix 6 and 7.
HONOURS

Honours at the ANU is awarded in a number of different ways:

- As a one year addition to the 3 year degree, with a substantial research component
- As an award involving a thesis additional to a pass degree in Law
- As a grade of achievement over the pass degree in Engineering (where all students take some form of research project during their undergraduate candidature)

The Honours degree is a degree of the Faculties. Staff from the IAS are involved in supervising, examining and moderating the degree. The Honours degree is one of several ways in which students typically prepare for postgraduate study, and in 2002 approximately one-fifth of students who completed Honours at ANU subsequently enrolled in a higher degree at ANU, and many others did so elsewhere. It serves a number of other functions, such as refining the graduate attributes highly valued by employers.

There are two types of Honours programs at ANU:- a specific One Year Honours Program, and (typically 4-year) programs which are awarded with Honours. Over the 4 years from 1999-2002, more than half (52.8%) of the 1225 students who were awarded the One Year Honours received first class Honours. In the same period, 47% of the 1748 students who completed with Bachelor Honours programs received the award of first class. This difference has remained steady over the 4 years for the two types of Honours.

The type of Honours program that a student enrolls in determines whether they will proceed to a higher degree at ANU. It is the graduates from the specific One Year Honours program who proceed to higher degrees.

<table>
<thead>
<tr>
<th>Year</th>
<th>Flow-on to Higher Degrees from ANU Honours Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>17%</td>
</tr>
<tr>
<td>2000</td>
<td>14.4%</td>
</tr>
<tr>
<td>2001</td>
<td>17.3%</td>
</tr>
<tr>
<td>2002</td>
<td>20.8%</td>
</tr>
</tbody>
</table>

Table 6: ANU Flow-on to Higher Degrees from Honours

The ANU’s research-led education results in a steady flow-on to higher degrees from the Honours programs (see Table 6). However it is also clear that not all proceed immediately to the Higher Degree in the year following the Honours award.

The Review of Undergraduate Education (2002) considered the nature and structure of Honours at the ANU. In its survey of the Honours practices, the Review Committee formed the view that Honours was the least coordinated and promoted of the University’s educational offerings. It therefore set about strengthening each Faculty’s Honours program, placing it directly under the supervision of the Faculty Deans who validate these degrees.

The Review in 2002 also recommended that there be a minimum 25 per cent research-work (thesis/project) component to all Honours degrees (Recommendation 4b) and that marking and/or moderation of Honours theses involve an examiner external to the Honours school to ensure that grade inflation does not occur.

The Deans of all Faculties were required to report to the University Education Committee on their implementation of these recommendations. In summary:

- The Faculty of Arts: Honours theses may be subject to external assessment and/or moderation by relevant staff outside the Faculty or from another Australian university.

- The Faculty of Asian Studies: every thesis should be assessed by an examiner outside the Faculty. The level of achievement of our honours graduates is consistently validated by these external examiners.

- The Faculty of Engineering and Information Technology: external moderators for validation of the thesis results. The moderators are asked to comment on a number of selected theses usually
representing a spread of grades. These moderators provide verbal reports to the examiners meeting and indicate that the standard of assessment is consistent with their institution.

- The Faculty of Law: does not use an external examiner for every honours thesis (up to 90 per year), but now has the practice, following the review, of having an external person on the honours thesis moderating committee.

- The Faculty of Science: an external examiner (the examiner need not necessarily be external to the University) whose task it is to:
  
  - to view the curriculum and assessment methods from the previous year as well as a sample of actual assessment;
  - to make an assessment in the middle of each year and make a report to the September meeting of Faculty;

  The Faculty of Science has recently addressed a reported difficulty in implementation of this because of lack of available examiners. Reconsideration of this matter is occurring with the possibility that a Faculty level reciprocal arrangement will be sought with a similar Faculty outside ANU.

- The Institute of the Arts (became part of the Faculty of Arts in 2004): has introduced changes and external moderation processes during 2003 and 2004.
The Australian National University (ANU) was established by the federal parliament in 1946 specifically to lead the development of the intellectual capacity of the nation through research and research training in line with the best international standards. As the specially chartered national university, the ANU continues to conduct research at the highest levels of international ranking in all its Research Schools, Faculties and Centres and offers a unique research-led education to undergraduate and postgraduate students. The ANU therefore advances the national intellectual and creative capacity:

- through broad-based research and research-led education in the disciplines fundamental to all knowledge: the humanities, the sciences, and the social sciences;
- by supporting research and research-led education in a spectrum of professional disciplines; and
- by studying Australia in its various contexts.

1. Introduction

1.1 The ANU's strategic goal in research is to position itself as one of the top universities in its selected fields.

1.2 The ANU is Australia's most research-intensive university, with an outstanding international research reputation, attracting many international visitors and engaging in a wide range of collaborative arrangements with universities in Australia and overseas.

1.3 Evidence of the ANU's research achievements and reputation includes:

- Being in the top 1% for 17 of 22 fields covered by the Essential Science Indicators;
- 18 of the 48 Australians currently honoured as “highly cited” by the Institute for Scientific Instrumentation (ISI) are from the ANU. This represents 56% of Group of Eight laureates and 41% of all university laureates;
- 35 Fellows of the Royal Society are members of staff of the ANU. The next highest number at an Australian university is six at the University of Melbourne;
- Topping the ARC 2003 Discovery funding awards and having the highest success rate (40%) of any university in the NHMRC 2003 funding round;
- Winning nine out of 49 ARC Federation Fellowships and five out of 25 ARC Professorial Fellowships for 2003;
- Being a foundation partner in the successful NICTA bid and being a partner in five out of eight ARC Centres of Excellence;
- In 2002, the ANU Philosophy Program was ranked number one nationally and in the top 14 programs in the English- speaking world internationally by the Philosophical Gourmet Report;
- In 2002 Dr Ted Maddess of the Visual Sciences Group in RSBS added the Clunies Ross Science and Technology Prize to the Australian Technology Prize for 1999 which he was awarded jointly with ANUTECH;
- Being ranked as the top Australian university in the 200 best performing institutions in economics worldwide;
- The John Curtin School of Medical Research (JCSMR) hosted the research that produced the key breakthrough that led to the award of the 1995 Nobel Prize in Physiology or Medicine to Peter Doherty and Rolf Zinkernagel; and
- Many other awards have been won by scientists from ANU, such as Professor Frank Fenner of the JCSMR who has been awarded of the Prime Minister's Prize for Science (2002), a Lifetime...
Contribution Award from the Clunies Ross Foundation (2002), the Albert Einstein Award (2000), the Copley Medal of the Royal Society (1995), and the Japan Prize (1988).

1.4 The ANU has two major sections: the Institute of Advanced Studies (IAS) which concentrates on research, research training and graduate coursework, and the Faculties (including the Institute of the Arts) which also engages in teaching undergraduate coursework students. There are also ANU research centres linked to the IAS or the Faculties academically. This diversity of academic areas contributes to a uniquely rich environment for students and staff. The Graduate School spans all sections of the ANU, facilitating the access of graduate students to this environment.

To further strengthen the links between the different parts of the ANU, 12 National Institutes have been created around broad academic themes to generate the best research and teaching environments in their areas in Australia. The National Institutes are virtual entities which draw together expertise from across the campus in a easily-identifiable form. The institutes are:

- ANU Institute for Indigenous Australia (ANUIIA)
- National Institute for Asia and the Pacific (NIAP)
- National Institute of Bioscience (NIB)
- National Institute for Environment (NIE)
- National Institute of Economics and Business (NIEB)
- National Institute of Engineering and Information Sciences (NIEIS)
- National Institute of Government and Law (NIGL)
- National Institute of the Humanities (NIH)
- National Institute of Health and Human Sciences (NIHHS)
- National Institute of the Physical Sciences (NIPS)
- National Institute of Social Sciences (NISS)
- National Institute of the Arts (NITA)

1.5 The ANU conducts research over a wide range of disciplines and promotes excellence in research by attracting and retaining high quality academic staff and by providing first class facilities to support their work. The IAS gives the ANU an important and distinctive role in Australian university research training. The block funding available to the IAS makes possible longer-term and larger scale basic research than normally can be undertaken through project oriented funding. It also enables the IAS to provide an excellent environment for both postdoctoral and postgraduate research training.

PART A
2. Research and Research Training Objectives

2.1 Research and Research Training Objectives

The ANU's strategic goal in research is to position itself as one of the world's top universities in its selected fields. Research at the ANU ranges from fundamental to strategic and applied, from theory to practice; and includes scholarship and creative activity. The ANU also prepares, as a priority, the next generation of researchers through post-doctoral training and research-based higher degrees. Research degrees at the ANU take one of two forms: they introduce students to research method and its application in a particular field (Masters), or they develop the capability to conduct independent research, during the course of which graduates will make a significant and original contribution to knowledge (PhD).

The ANU's primary research objectives are to:

- Use our research capacity to lead our nation in tackling questions that require research strength and depth within and between disciplines, while producing leaders in international research; and
- Achieve national leadership through world class performance in fundamental, strategic, and applied research, scholarship and creative activity in all fields represented in the ANU.

By 2005, the ANU will:

- Select and develop strategic research strengths;
- Support and develop essential core disciplines and interdisciplinary research;
- Secure increased financial and other resources to support research;
- Provide options for policy advice and development;
- Provide top quality supervision and mentorship;
• Secure exceptional additional scholarship and other support for students;
• Foster linkages and exchanges with other universities and research organisations, in Australia and internationally;
• Increase the awareness of the value of intellectual property, and manage it, and technology transfer, in the best interests of staff and students; and
• Communicate research strengths and achievements externally and internally.

Ensuring the Achievement of the University’s Objectives
Recently the ANU implemented the *Research and Postgraduate Activity Spreadsheet* which reports on research funding and HDR load from 1997 to 2002 together with projections for 2003 to 2007. This allows the performance of ANU Schools, Faculties and Centres to be compared quickly and easily.

As set out in *ANU to 2005 Preparing Ourselves*, the ANU is also implementing a range of measures of its performance under its objectives:

• Number of *weighted* publications per FTE academic staff (averaged over 3 calendar years). Based on DEST publication categories, ISI analysis, and appropriate output/impact measures for other disciplines;
• Dollars per category of research grant. Other public sector research income, and industry and other research income per FTE. CRC and other Centre research income per FTE. Success rates per category of research grant. Ratio of total grant funding to FTE academic staff. Research income as proportion of total expenditure. Performance relative to other peer universities;
• Trend data showing satisfaction levels for research degree students based on questionnaires;
• Quality of supervision as revealed by PREQ;
• PhD, Masters and Honours completions within time and by field of study;
• HDR load per FTE academic staff;
• Honours and distinctions accorded to staff;
• Impact measures: citations, patents, licences. Major recognition through international/national invited lectures;
• National and international linkages, service to government and professional societies;
• Clearly communicated ANU research, research training, IP and technology transfer objectives, plans, and performance indicators reviewed annually by user groups and the Research Committee;
• Annual growth of at least 10% in external resources including HDR student grants and consultancies; and
• Increase in successful grant applications and bids for CRC's Centre of Excellence, major infrastructure, national and international initiatives, supporting bid managers where appropriate to enhance competitiveness.

Quality assurance mechanisms for these measures are being developed as part of the ANU’s *Research and Research Training Management Plan*.

Contribution of research and research training to the University’s Mission
The ANU’s mission is:

*Through the relentless pursuit of excellence, the Australian National University will be one of the world’s top universities*

The ANU’s research and research training has enabled it to acquire a strong international reputation for research as Australia’s most research-intensive university. Evidence for this includes:

ANU researchers held six of the top ten positions in the high-impact science paper list published in 2001 by the Institute of Scientific Information, including first, second and third on the high-impact list of Australian scientists.

A comparison of independent data on the research impact of ANU academics’ papers with similar data from a 2001 study by Britain's *The Guardian* newspaper, shows that in 17 major research fields ANU ranks in the top 1% of the world, it leads in the environmental sciences, and is in the top three in mathematics. (*The Guardian*'s survey used Institute of Scientific Information data on the research quality of universities and other institutions in Europe and the United States).

ANU is the top Australian university in the 200 best performing institutions in economics worldwide, according to the list, *Rankings of Academic Journals and Institutions in Economics* published in 2002.
2.2 Current and Emerging Areas of Research Strength

The themes for the ANU’s National Institutes were selected to reflect its academic strengths and hence its current and emerging areas of research strength. The breadth of academic endeavour covered by the themes demonstrates the breadth of research at the ANU. The themes are:

- the Arts
- Asia and the Pacific
- Bioscience
- Economics and Business
- Engineering and Information Sciences
- the Environment
- Government and Law
- Health and Human Sciences
- the Humanities
- Indigenous Australia
- Physical Sciences
- Social Sciences

The depth of ANU’s international research strength is shown by an analysis of total number of citations from the ISI database over a ten-year period. This analysis shows that the ANU ranks in the top 100 institutions in the world in 10 out of 21 fields of research:

- Chemistry (73rd)
- Economics and Business (96th)
- Environment/Ecology (55th)
- Geosciences (10th)
- Immunology (97th)
- Mathematics (38th)
- Physics (96th)
- Plant and Animal Sciences (38th)
- Social Sciences (62nd)
- Space Science (21st)

This performance places it as the best performing Australian university, ranked 21st amongst non-US universities (University of Sydney 35th and the University of Melbourne 65th).

The ANU provides unique experimental and observational facilities in key areas where the complexity and cost is such that the provision is best concentrated in one location rather than fragmented across many Australian institutions. These facilities include:

- The Heliac H1 Fusion Research Device, the Superconducting Booster Linear Particle Accelerator (LINAC);
- The Heavy Ion Accelerator Facility, Materials Modification, Characterisation, and Processing Facility;
- The Australian National Seismic Imaging Resource (ANSIR) (jointly managed by ANU and AGSO);
- The Sensitive High Resolution Ion Microprobe (SHRIMP);
- The Australian Partnership for Advanced Computing (APAC);
- Siding Spring Observatory;
- Library holdings and Web-based materials of world significance on the Asia Pacific (accessed by scholars around the world);
- The Noel Butlin Archives Centre (a nationally significant collection of primary source material relating to business and labour); and
- The Centre of Excellence in Information and Communications Technology (lead consortium member).

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13 Linda Butler, Research Evaluation and Policy Project
2.3 **Generic Attributes of Research Graduates**

Consistent with its mission and national research role, the ANU seeks to develop research degree graduates who:

- are able to undertake independent research resulting in a substantial contribution to knowledge;
- are able to relate their research to the broader framework of their discipline or inter-disciplinary fields;
- have an in-depth knowledge base and comprehensive understanding of the conceptual and theoretical underpinning of their disciplines or inter-disciplinary fields, including ethical considerations;
- are trained in computer-based technology, and relevant discipline-based technical and methodological skills;
- are independent thinkers with analytical and problem-solving skills;
- are able to analyse others' research results critically; and
- are competent in written and oral communication.

These attributes are developed through individual and small group research training with supervisors and advisers within an intensive research culture, and by support from specialist learning support staff as appropriate. A Graduate School Academic and Professional Skills Program (APSP) is provided for research students, with major components including the Graduate Information Literacy Program and Statistical Consulting Unit short courses \(^{14}\), and other short course training in generic fields.

3. **Future Directions for Research and Research Training**

3.1 **Future Directions**

The ANU’s broad future research directions priorities are set out in the ANU’s strategic planning document *ANU to 2005: Preparing Ourselves*. These are then developed through the ANU’s research advisory and management structure in the light of national priorities, which the ANU currently identifies as global integration, applying information and communications technologies, environmental sustainability and biological technologies.

3.2 **Major Priorities, Strategies, Targets and Timeframes**

The ANU has undertaken a research priority setting exercise, identifying a broad framework of research priorities within each of area of research strength, represented by the broad themes of the National Institutes. Because of the wide range and nature of research at the ANU, a broad definition is applied. The identified research priorities are supported by major research programs listed in Attachment A:

- The ANU undertakes a broad range of fundamental research in all its areas of research strength. Subsets of this support all of the current National Research Priorities:
  - an environmentally sustainable Australia
    Supported by research priorities under the themes of the Environment, Indigenous Australia, Physical Sciences and Social Sciences.
  - promoting and maintaining good health
    Supported by research priorities under the theme of Health and Human Sciences.
  - frontier technologies for building and transforming Australian industry
    Supported by research priorities under the themes of Engineering and Information Science and Physical Sciences.
  - safeguarding Australia
    Supported by research priorities under the themes of Asia and the Pacific, Economics and Business and Government and Law.

The implementation of the White Papers, *Knowledge and Innovation*, and *Backing Australia’s Ability* have had significant implications for the ANU and its future strategies in the management of research and research training. In particular, the IAS is now participating in all national competitive research funding schemes. The new arrangements have had the following consequences for the ANU:

- Access to project funding through the ARC and NH&MRC has required IAS Schools to develop mechanisms to integrate externally determined priorities with those determined internally.

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\(^{14}\) http://www.anu.edu.au/graduate/services/acadskills.html
Availability of additional RTS places is encouraging academic areas to make the best use of available staff and resources for research training.

The limited number of APA scholarships available to the ANU, relative to its eligibility for RTS places, will affect the ANU's capacity to utilise the additional places.

The projected fall in infrastructure funding through the Institutional Grants Scheme (IGS) will diminish the ANU's capacity to adequately resource the additional RTS places it is able to fill.

In response, the ANU has implemented the following strategies:

- The ANU has negotiated with the ARC and NH&MRC for the removal of the caps on funding and phasing of entry of the IAS to ARC and NH&MRC programs from the 2003 funding round.
- Development of a program to promote the excellent opportunities for postgraduate research through the ANU Graduate School.
- Strengthening of the ANU's capacity to attract external funding.
- Expansion of the ANU's already extensive postgraduate and honours scholarships schemes.

ANU to 2005: Preparing Ourselves establishes targets for an increase in higher degree research load, of 100 EFTSU per year for Australian citizens and permanent residents to 2005, and an increase per year in overseas student load.

The higher degree research student load projections for 2002-2006 are shown in Table 1, consistent with DEST funding advice received to date. The University has an over-enrolment RTS EFTSU target strategy (e.g. assuming the same high-cost/low-cost ratio as in 2002, the ANU's 2003 and 2004 RTS funding would provide funding for 910 EFTSU in 2003 and 956 EFTSU in 2004. Consequently the ANU RTS targets in Table 1 for 2003 and 2004 would result in load of 54 and 108 EFTSU respectively above that funded by the ANU's RTS funding.)

<table>
<thead>
<tr>
<th>Type of HDR Load</th>
<th>EFTSU</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2002 (Actual)</td>
<td>2003</td>
<td>2004</td>
<td>2005</td>
<td>2006</td>
</tr>
<tr>
<td>HECS exempt RTS</td>
<td>864</td>
<td>964</td>
<td>1064</td>
<td>1164</td>
<td>1164</td>
</tr>
<tr>
<td>HECS liable</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overseas fee-paying</td>
<td>312</td>
<td>370</td>
<td>375</td>
<td>380</td>
<td>385</td>
</tr>
<tr>
<td>Total HDR load</td>
<td>1184</td>
<td>1334</td>
<td>1439</td>
<td>1544</td>
<td>1549</td>
</tr>
</tbody>
</table>

**Table 1: Projection of Growth in Higher Degree Research Load 2002-2005**

The University's already extensive postgraduate and honours scholarships schemes have been expanded with an additional $1.8 million of central funds p.a. from 2002 – 2004, an additional $1.5 million from 2003-2005, and additional scholarship funding from Schools, Faculties and Centres.

Research training places, along with associated scholarships, are selectively allocated to the ANU's areas of research strength, for competitive candidates of the highest quality (see Section 5.1).

Specific targets for ANU in research by the end of 2005 are:

- Implement the recommendations of current policy reviews in research, research training, intellectual property and technology transfer.
- Implement an ANU-wide strategic research and research training plan for managing priorities, strengths and emerging areas of opportunity for individuals and teams in National Institutes, Research Schools, Faculties and Centres.
- Implement the recommendations of current planning reviews of the Research Office, the Graduate School and ANUTECH, building teamwork and an enabling, service culture.
- Introduce an annual Research Opportunities workshop, in and between National Institutes, to foster new synergies and critical mass, encourage change and competitiveness.

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15 All figures rounded to nearest whole number
• Improve the relative performance and impact of ANU Research, reflected in international and national research indicators and benchmarks.
• Complete a research and research training management database to facilitate and monitor strategic planning, research assessment, performance and progress.
• Implement a professional development program for staff, postdoctoral fellows, and graduate students and honours students.
• Increase the number of post-graduate scholarships. Encourage appropriate and timely completion of research degrees. Consider the reintroduction of achievable oral examinations.
• Establish a research development fund and a separate innovation and technology transfer fund to assist new initiatives and competitive grant proposals.
• Generate initiatives to commercialise intellectual property with potential returns to staff, research units and the ANU.
• Improve national and international awareness of ANU Research, research training, intellectual property and technology transfer, as a result of effective annual action plans in research, resource mobilisation, marketing and communication.

4. Managing Research Performance

4.1 Planning and resource allocation processes

The ANU’s current organisational structures were established in 2001, and include:

• an Academic Board to advise the Vice-Chancellor and Council;
• three major ANU committees for Research, Education, and Information Strategy;
• a Board of the Institute of Advanced Studies, a Board of the National Institute of the Arts and a Board of The Faculties that enable consultative discussion and development; and
• the position of Deputy Vice-Chancellor (Research).

The Deputy Vice-Chancellor (Research) is responsible for research, research training, intellectual property and technology transfer at the ANU, and Chairs the Research Committee.

The Research Committee has the task of planning ANU research policy in response to the recommendations of the Government's 1999 White Paper Knowledge and Innovation and of Backing Australia’s Ability. The membership and functions of the Committee are set out in Attachment B. Decisions on overall priorities for the IAS are also informed by advice from the Research Advisory Council which has substantial international membership. The Research Committee now takes responsibility for strategic planning with appropriate working parties.

Research training and teaching is supported centrally through the Graduate School and its Dean and through the Graduate Degrees Committee. This structure is responsible to the Education and Research Committees for all aspects of research training at the ANU. A planning review of the Graduate School was commissioned in June 2002 and reported to the Research Committee in November 2002. The review provided clear strategies, performance indicators and set up a user group to assist in future development.

Within the ANU’s overall framework of research priorities, Heads of the IAS’s Schools and Centres and Deans of Faculties are responsible for research management in their respective academic areas, and for resources to support research and research training. While the institutional structure of the ANU and the nature of higher education funding in Australia necessitate a degree of centralised research management and accountability, the ANU seeks where possible to devolve the responsibility for management and resource allocation to the individual Schools, Centres and Faculties. Deans and Directors are assisted by periodic external reviews of research areas and the Research Advisory Boards of each School and Centre.

Research and Discovery is supported through the Research Office and Intellectual Property and Technology Transfer by ANUTECH. Both of these areas were reviewed during 2002, with future directions, performance indicators and user groups being developed. The ANU encourages staff to apply for external funding in the form of grants, research contracts and consultancies. The ANU’s policy on accepting such funding is given in Policy On Applying For and Accepting Research Grants, Contracts And Consultancies,16 and is administered by the Research Office and ANUTECH. ANU policy provides for the full costing of research projects funded by outside sources including charging, wherever possible, the full cost of School/Faculty and central areas.

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overheads. Exceptions are made for granting bodies included in the National Competitive Grants Index used for the allocation of Research Infrastructure Block Grants and in certain other cases. To ensure that research projects are properly costed, the ANU has introduced a costing template that must be completed for all applications for external funding.

**Ethics**

The ANU is committed to high standards of ethics in the conduct of research. A code of conduct has been established for the responsible practice of research. Policies covering general ethical considerations, procedures for dealing with problems of research misconduct, and issues such as retention of data, publication and authorship, the role of research supervisors, disclosure of potential conflict of interest and special needs in different disciplines have been instituted. The ANU complies with the National Health and Medical Research Council Statement on Scientific Practice and the Australian Vice-Chancellors’ Committee Guidelines for Responsible Practice in Research and Dealing with Problems of Research Misconduct. Three committees deal with particular aspects of ethics in research:

- The Animal Experimentation Ethics Committee monitors and regulates the use of animals in research and teaching carried out at the ANU, and ensures that the ANU's practices conform to the ACT Welfare Act 1992.
- The Recombinant DNA Monitoring Committee regulates recombinant DNA research at the ANU.
- The Human Research Ethics Committee considers the ethical implications of proposals for all experimental research projects involving human subjects to determine whether or not the proposals are acceptable on ethical grounds.

**Support for Staff Development**

Professional development of academic staff and postdoctoral fellows is the responsibility of heads of academic areas, supported by the Centre for Educational Development and Academic Methods (CEDAM). CEDAM provides programs to assist the development of academic staff including an academic leadership program.

The Research Office provides workshops on applying for grants, including Australian Research Council and NH&MRC Grants and Fellowships. These workshops provide opportunities for applicants to solicit feedback and advice on draft applications. In addition, the Research Office conducts information sessions on other granting programs, participates in induction workshops for new staff, provides presentations to individual departments and Schools on sources of external funding, and assists staff in preparing their applications. The Graduate School provides support for doctoral candidates employed as tutors or demonstrators through the Graduate Teaching Program, a one semester, seminar-based course for teaching development.

**Postdoctoral Research Training**

The ANU places a particular emphasis on postdoctoral training, devoting a considerable part of its own resources to the provision of postdoctoral fellowships (PDF) as well as to attracting a large number of fellows funded from external sources. The IAS, in particular, has a pre-eminent role in the provision of postdoctoral training in Australia and accordingly maintains a complementary focus on postgraduate and postdoctoral training.

### 4.2 Performance Monitoring Arrangements

**Reviews of academic staff**

The ANU had a long-standing practice of biennial reviews of academic staff to appraise all aspects of individual performance, including research plans and achievements. These reviews became annual from 2002.

**Reviews of Academic Areas**

The ANU has a single process for the review of academic areas. There is an annual review for each School, Faculty and Centre, prepared by the Dean or Director and submitted to the Vice Chancellor. These report provide the source information for five-yearly major reviews carried out by review teams consisting of external experts and peers.

**Review of the IAS**

The performance of the IAS is subject to major Government-initiated external reviews. The most recent was carried out in 1995 by a Review Committee constituted entirely of external members, half of whom were senior international academics. Eleven Committees of Review, covering each School and Centre in the IAS, supported the Review Committee. Peer assessment was the prime method used by the Review to evaluate research performance. Other indicators used to assess performance and international standing were invitations for staff to deliver lectures at major international meetings, the ability to attract distinguished
overseas visitors and staff honours and awards. Bibliometric and contextual data providing comparisons between the IAS School/Centre and relevant areas at other Australian universities supplemented these assessments. The Review concluded that:

Although in individual fields and subfields the research performance of the Institute may be matched by that of another Australian institution, no other Australian institution, and few institutions in the world, can match the high standards of performance that we judge to have been attained by the Schools and Centres of the IAS.

The timing of the next review is yet to be determined. A review would be most appropriate after the transitional period of phase-in to DEST and ARC and NH&MRC grant schemes (also taking into account reporting lag time) has been completed.

Recent Research Performance
As part of its performance monitoring process, the ANU measures a number of indices of research performance. In Table 2, the ANU is compared with other major research-intensive universities on two of these indicators of research quality and performance.

**TABLE 2: MAJOR RESEARCH UNIVERSITIES COMPARED ON INDICATORS OF RESEARCH PERFORMANCE**

<table>
<thead>
<tr>
<th>Major Research Universities</th>
<th>1996-00 ISI Citations(^1)</th>
<th>Membership of the Australian Academies in 2002(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANU</td>
<td>14.8%</td>
<td>24%</td>
</tr>
<tr>
<td>Sydney</td>
<td>13.4%</td>
<td>11%</td>
</tr>
<tr>
<td>Melbourne</td>
<td>12.6%</td>
<td>12%</td>
</tr>
<tr>
<td>Queensland</td>
<td>11.0%</td>
<td>5%</td>
</tr>
<tr>
<td>UNSW</td>
<td>9.8%</td>
<td>7%</td>
</tr>
<tr>
<td>Monash</td>
<td>8.4%</td>
<td>7%</td>
</tr>
<tr>
<td>UWA</td>
<td>7.0%</td>
<td>6%</td>
</tr>
<tr>
<td>Adelaide</td>
<td>6.1%</td>
<td>5%</td>
</tr>
<tr>
<td>All Australian Universities</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

1 Figures include publications in all three main indexes: Science, Social Science, and Arts & Humanities Citation Indexes.
2 The Australian Academy of Science, the Australia Academy of Technological Sciences and Engineering, the Australian Academy of Social Sciences and the Australian Academy of the Humanities.

Publications and Citations
Table 2 shows that the ANU has the largest proportion of citations to articles listed by the Institute of Scientific Information (ISI) for an Australian university over the period 1996-00. Over the decade 1992-2002 ANU non-clinical medicine research publication were cited almost 40% more often than the nearest other Australian university (Melbourne).\(^17\) ANU tops twice as many ISI subject areas for citations than the next nearest Australian university (Sydney).\(^18\) Publications, and especially citations, are useful measures of university research output. It is important to note, however, that their significance as measures differs from one field of research to another.

New ARC Fellowships and Federation Fellowships
The ANU consistently performs well in attracting ARC research fellows, as shown in Table 3. In the 2003, funding round, the ANU ranked first in attracting recipients of ARC fellowships.

\(^{18}\) ibid.
New ARC Discovery Grants
The ANU has consistently performed very well, on a per capita basis, in obtaining ARC Discovery Grants. In the 2003 round of ARC Discovery Grants (Table 3), the ANU was the most successful institution in obtaining ARC Discovery Grants per academic staff member, both for number of grants and value of grants.

**Table 3: 2003 Comparison of ARC Grants and Federation Fellowships**

<table>
<thead>
<tr>
<th>Universities</th>
<th>New ARC Fellowships in All Categories 2003</th>
<th>ARC Federation Fellows 2002 and 2003</th>
<th>2003 ARC Discovery Grants per FTE of academic researchers</th>
<th>2003 ARC Discovery Grants $ '000 per FTE of academic researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Rank</td>
<td>No.</td>
<td>Rank</td>
</tr>
<tr>
<td>ANU</td>
<td>27</td>
<td>1</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Sydney</td>
<td>19</td>
<td>2</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Queensland</td>
<td>19</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Melbourne</td>
<td>13</td>
<td>4</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>UNSW</td>
<td>10</td>
<td>7</td>
<td>4</td>
<td>5</td>
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<tr>
<td>UWA</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>7</td>
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<tr>
<td>Adelaide</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Monash</td>
<td>11</td>
<td>6</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

External Research Income
Given that university research income in Australia is dominated by ARC and NH&MRC funding and that, until 2002 the IAS was ineligible for much of this funding, comparison of the ANU's performance with that of other universities using the data collected in the HERDC is misleading. The trend in research income of the ANU, however, is shown in Table 4 for the period 1995-2001.

**Table 4: ANU External Research Income 1995-2002 ($m)**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Australian Competitive Grants Income</td>
<td>14.6</td>
<td>15.4</td>
<td>18.4</td>
<td>19.3</td>
<td>19.0</td>
<td>21.1</td>
<td>19.9</td>
<td>30.3</td>
</tr>
<tr>
<td>Other Government</td>
<td>8.5</td>
<td>8.5</td>
<td>15.5</td>
<td>8.8</td>
<td>12.0</td>
<td>8.9</td>
<td>10.4</td>
<td>13.6</td>
</tr>
<tr>
<td>Industry and Other</td>
<td>12.1</td>
<td>9.4</td>
<td>10.3</td>
<td>11.9</td>
<td>13.9</td>
<td>14.0</td>
<td>20.7</td>
<td>20.5</td>
</tr>
<tr>
<td>TOTAL (external income)</td>
<td>35.2</td>
<td>33.3</td>
<td>44.2</td>
<td>40.0</td>
<td>44.9</td>
<td>44.0</td>
<td>51.0</td>
<td>64.3</td>
</tr>
</tbody>
</table>

Source: External income from DEST Higher Education Research Data Collection (excluding CRC income).

4.3 Benchmarking
The ANU uses a variety of mechanisms to compare its research activities and outcomes with national and international standards.

Quality of staff
As a foundation of its quality assurance processes, the ANU’s objective is to attract and retain the highest calibre of staff available. The ANU monitors (a) the proportion of its staff holding higher degrees and (b) peer recognition, as evidenced by memberships of learned academies (see Table 2). Account is also taken of prestigious national and international awards, major lectureships and invitations as keynote speakers. At all stages of appointment and promotion processes, the standard required is benchmarked against standards at other equivalent institutions.
**Citations**
The ANU believes it is essential to look beyond measures of income and publications if a true indication of quality of research output is to be obtained. Accordingly, with the assistance of the ANU’s Research Evaluation and Policy Project, research performance in terms of citations per paper and citations per staff member are measured. The ANU’s outstanding performance in producing ISI citation laureates has been noted above.

**Research training**
In addition to the strategies for monitoring research student progress outlined below (Section 5.4), the ANU monitors completion rates and completion times; and the employment destinations of its graduates both through the Graduate Destinations Survey and informally through supervisors and Deans and Directors.

**4.4 Incentives to Reward Research Performance**
The ANU maintains a wide range of research management and performance monitoring mechanisms designed to stimulate and reward research performance. These cover the range of resource allocation processes as well as staffing policies. Incentives to reward research performance by individual staff include market and merit loadings (in appropriate circumstances), an intellectual property policy under which the originator receives a proportion of commercial returns, and study leave provisions that have scope for giving outstanding researchers significant periods at leading international research locations, provided there is clear evidence of substantial research returns to the individual and the ANU. Meritorious achievements are recognised in remuneration. For example, professorial staff of high distinction are appointed at a grade (Level E2) above the standard Level E grade. Staff who become Fellows of the Royal Society, or who receive equivalent international recognition are reviewed by a special committee for appointment to a Level E3 grade.

**4.5 Conflict of Interest**
The ANU has developed policies covering conflict of interest in the conduct of research and its commercialisation. This policy came into effect in 2002. Details of the policy can be found at: [http://www.anu.edu.au/cabs/policies/1303a_conflictofinterest.pdf](http://www.anu.edu.au/cabs/policies/1303a_conflictofinterest.pdf)

**4.6 Structures and Resources to Support Research**

**Operating Grants**
From 2002, a new resource allocation process was established through the Vice-Chancellor. The new arrangements created incentives for academic areas to respond directly to institutional priorities. For research only areas, research performance, levels of research training activity and productivity are the key criteria. Other criteria are the ability to attract external support, strategic priorities and the scope to lead to applications for external support.

**Institutional Grants Scheme**
The ANU allocated $13.266 m of its 2002 Institutional Grants Scheme (IGS) funds to Faculties, Schools and Centres. Individual faculties were then responsible for the allocation of these funds to research areas. The remaining funding was used to support central research development. In 2003, the ANU allocated 70% of Institutional Grants Scheme funding to Faculties, Schools and Centres on the basis of their research performance as reflected by the DEST allocation formula. The remaining funding was used to support central research development.

**Research Infrastructure Block Grant**
For 2002, $5.009 m of the ANU’s Research Infrastructure Block Grant (RIBG) funding was allocated to Schools, Faculties and Centres. The remaining RIBG funds were retained for selective allocation. Funds have been allocated to areas of research strength, to strategically important areas and to foster new developments. The process for allocating funds to Faculties ensured that the project-related infrastructure of their Australian Competitive Grants was supported, in line with the first Objective of the RIBG program. The allocation of the remainder of the funds on a strategic basis ensured that funding was provided to areas of research strength and to areas of recognised research potential, the second and third Objectives of the Program. For 2003 70% of the ANU’s Research Infrastructure Block Grant (RIBG) funding is allocated to Schools, Faculties and Centres on the basis of their research performance as reflected by the Australian Competitive Grants Index. The remaining 30% of the RIBG is retained for selective allocation.
Major Equipment Expenditure

The Committee on Major Equipment Expenditure funds the purchase of large equipment ($70,000 to $500,000) for research purposes on the basis of a highly competitive submission process based on assessments of research priorities and excellence. This includes the replacement of obsolete equipment, provision of new types of equipment and computing equipment, and special library collections. Bids are assessed on:

- the quality of the research activity to be supported by the equipment;
- relationship of the bid to the ANU’s strategic planning;
- the strategic plans of the School/Centre/Faculty;
- the level of financial commitment to the scheme by the School/Centre/Faculty; and
- the efficiency of use of the equipment and the improved research environment.

4.7 Recent Research Achievements

Some recent examples of research achievements are given in Attachment C.

5. Ensuring a Quality Research Training Experience

5.1 Allocation of research places to areas of research strength

Allocation of research training places and scholarships to areas of research strength or outstanding individual researchers is determined by two complementary allocation mechanisms. Priority in allocation of RTS places is given to HDR candidates awarded scholarships, followed by other PhD, professional doctorate (by research) and MPhil candidates. Directors and Deans allocate ANU PhD scholarships (with associated RTS places) to applicants in their specialist areas of research strength. These areas of research strength are subject to the normal IAS, Faculties and Centres performance monitoring and priority review arrangements, which include establishing new priority areas and closing low priority areas. Success in attracting ARC grants has been in the Faculties, and will be in the IAS from 2002, an important criterion in this process.

Australian Postgraduate Awards (APA) and ANU Graduate School Scholarships (GSS) are awarded on the basis of academic merit, with major weight given to the quality of the research proposal and background of first class Honours or equivalent applicants.

5.2 Policies and approaches - research student supervision

The ANU’s Guidelines for Supervision and Candidature\(^1\) define the roles of doctoral research students and their supervisory panels, comprised of at least three academic supervisors and advisers for each student. These mandatory panels include external and industry advisers as appropriate, facilitating research training networks. Supervision of MPhil students is also defined in ANU guidelines.\(^2\)

5.3 Policies governing students’ access to resources

Admission of individual research students to candidature is subject to formal confirmation of availability of appropriate supervision and other research training resources by the Dean or Director. The ANU’s Policy on Minimum Allocation of Resources for Full-Time Research Students\(^3\) ensures a minimum resources basis for quality research training. Each School, Faculty and Centre implements and supplements this policy framework, with research training resources normally exceeding the minimum policy requirements.

5.4 Strategies to monitor research student progress

Annual Report: All research students must produce an annual report that is reviewed by the chair of the supervisory panel, the head of the academic area and the Dean or Director. Continuing candidature is contingent on satisfactory annual progress, and progress problems are addressed in this framework.

Mid-term reviews of all PhD students’ progress are carried out, normally at the end of the third semester of full-time enrolment. The review of a candidate’s performance and research typically includes the presentation of a written paper or a seminar presentation. The chair of the supervisory panel and the Head of Department

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\(^1\) [http://www.anu.edu.au/graduate/info_staff/phd_supervision.html](http://www.anu.edu.au/graduate/info_staff/phd_supervision.html)


\(^3\) [http://www.anu.edu.au/graduate/papers/1573b-98.html](http://www.anu.edu.au/graduate/papers/1573b-98.html)
provide the Director or Dean with a written report on the review assessing whether progress is satisfactory and any problems that have emerged and how they are to be dealt with. If progress has not been satisfactory the Director or Dean may recommend that enrolment should be terminated or recommend transfer to a Master of Philosophy program.

**ANUDEQ and CEDAM:** The Centre for Educational Development and Academic Methods (CEDAM) constructed an *ANU Doctoral Experience Questionnaire* (ANUDEQ) in 2000-01 which has been implemented on-line. ANUDEQ gathers detailed information about the experiences of ANU doctoral candidates, and this information will be used to improve the quality of research training and services to research degree students by monitoring student feedback. Individual graduate programs also work with CEDAM to identify research training needs and to improve policies and practices to maximise student progress.

**PhD examinations:** Examinations are a final measure of student progress and not less than two examiners, at least one of whom must be external to the ANU, are appointed for each PhD thesis. A significant proportion of examiners come from overseas. Cohort completion rates for the most recently completed PhD cohorts average over 80 percent and are monitored by the ANU.

5.5 **Policies and processes - research student grievances**

Grievance procedures for graduate students are specified in the *Graduate School Policy Papers.* There is also a separate *Policy for Discrimination and Harassment Grievance Resolution* introduced in 2002. Research students are encouraged to seek resolutions of grievances with the assistance of the Dean of the Graduate School before formal grievance processes are initiated.

5.6 **Learning support for research students**

Learning support is provided by specialist staff, e.g. in the Graduate School (the Statistical Consulting Unit, and the Graduate Teaching Program), and in the Academic Skills and Learning Centre (with specialist Graduate Student Advisers and courses). For example, the Graduate School provides learning support for doctoral candidates employed as tutors or demonstrators through the Graduate Teaching Program, a one semester course for teaching development. These support facilities are detailed for research students in the *Graduate School Postgraduate Research Guide*. In addition, learning support has been enhanced by the Graduate School’s Academic and Professional Skills Program, including a Graduate Information Literacy Program (a joint initiative of the Division of Information and the Graduate School).

5.7 **Staff development for supervisors**

New staff undertake staff development through a “Supervising Research Students” workshop run by CEDAM and the Graduate School each semester. This workshop is intended primarily for new or less experienced supervisors, but it is open to any staff member who is a member of a supervisory panel for a PhD student, supervising MPhil students, or a potential supervisor. The workshop includes a presentation on ANU policy on supervision, a discussion of the special role of supervisory panels at ANU, an opportunity to clarify individual expectations of the supervisory role, a presentation of supervisor and research student perspectives on supervision, and an exploration of the supervisory framework and process.

5.8 **Structures and resources supporting research training**

Under the aegis of the Dean of the Graduate School, reporting to the Deputy Vice-Chancellor (Education and Research), the Graduate School is the university-wide structure responsible for the development and implementation of cross-campus policies designed to ensure and enhance the quality of the research students’ research training experience. The Graduate School’s campus-wide Graduate Programs, each with an appointed Convenor, bring together staff expertise from across the ANU to add value to research training through inductions and forums, academic and professional workshops, and academic advisors.

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27 [http://www.anu.edu.au/graduate/info_staff/supervision_workshop.html](http://www.anu.edu.au/graduate/info_staff/supervision_workshop.html)
Research Schools, Faculties and Centres provide the local academic structure for research students, where they are located and where local resources are delivered. The ANU's resources for research training in areas of research strength are among the best in Australia. These resources reflect the primary research commitment and funding of the Institute of Advanced Studies (IAS) as well as the substantial research activities in the Faculties and Centres funded from external grants as well as internal funds. Research students and postdoctoral researchers (PDRs) are integrated in international quality research laboratories and groups, with PDRs working closely with research students in the natural sciences. There are a very large number of international visitors who enhance ANU's research resources for students and PDRs.

The ANU's Graduate Degrees Committee (GDC), chaired by the Dean of the Graduate School, provides an academic committee structure to support research training, including consideration of individual student cases. GDC is responsible to the Education Committee and the Research Committee in relation to research training and teaching in the ANU.

5.9 Recent achievements in research training

The major achievement of ANU's research training is the maintenance of a successful PhD completion rate of over 80% of commencing PhD students (PhD Cohort Study\(^{28}\)). This achievement reflects the strengths of the selection, supervisory panel, research infrastructure support and other processes at the university. The Graduate Degrees Committee reviews data on withdrawals and non-completions each year to identify any factors which require additional university action; and monitors PhD examinations at each meeting to maximise timely completions.

The successful introduction of the Graduate Information Literacy Program (GILP) from 2001, as a joint Division of Information - Graduate School initiative, has been a significant additional achievement\(^{29}\). GILP ensures that research students can access ANU-wide training in computer-based technology at appropriate levels to develop information literacy skills across the full range of relevant fields. This program includes innovative, advanced courses such as Managing the Thesis Production Process, The Literature Review, and E-Publishing of Theses and Research Papers. The ANU also offers short course training options in subjects such as management, commercialisation and research methodology to assist broad professional development.

6. Collaboration and Partnerships

6.1 ANU Strategies and Support for Cross-disciplinary and Cross-institutional Collaboration

The ANU supports cross-disciplinary research through the establishment of cross-disciplinary centres and institutes, such as the Centre for Resource and Environmental Studies, the Mathematical Sciences Institute, the Centre for Cross-Cultural Research, the Humanities Research Centre, the Centre for Aboriginal Economic Policy Research, the Centre for the Mind, and the Centre for Bioinformation Science. In addition, the entry of the IAS into the ARC competitive grants schemes has facilitated more movement, and cross-disciplinary interaction (including collaborative research and greater sharing of resources) between the IAS and the Faculties. The National Institutes (see 1.4 and 4.1) offer joint seminars, workshops, research programs and research supervision.

The ANU's extensive range of research activities gives it the capacity to rapidly mobilise researchers in synergistic endeavours in response to new opportunities, new technologies or national imperatives. Some of the over-arching programs have been recognised as virtual centres or 'centres without walls' and facilitate sharing of expertise and resources across disciplines in thematic joint endeavours. Cross-disciplinary programs include:

- The ANU Medical School will be innovative and rurally focussed and will have a strong research focus. It will involve co-operation with the Departments of Health of the ACT, NSW and Commonwealth, the Canberra Hospital, and local and regional GPs and hospitals as well as JCSMR and the Faculty of Science at ANU.

- Asian Studies, which brings together the expertise and resources of the Research School of Pacific and Asian Studies, the Faculty of Asian Studies and the Faculty of Arts to provide an important international centre for the study of Southeast Asia and East Asia;

- Centre for Resource and Environmental Studies, which undertakes interdisciplinary research into a range of environmental and resource issues. Such studies focus primarily on Australia and are particularly concerned with policy options and implications;

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\(^{28}\) PhD Cohort Study (PDF), [http://www.anu.edu.au/admin/planning/stats.html](http://www.anu.edu.au/admin/planning/stats.html)

• REGNET, the Regulatory Institutions Network, is a network of scholars and practitioners that is co-ordinated by the ANU. The key idea of RegNet's research agenda is that challenges like sustainable development, competitive markets, consumer protection, crime control, improved health, accountability in government and human rights are topics productively investigated within a framework of regulatory theory and evidence-based policy design;

• The Humanities Research Centre (HRC) plays a key role as an international centre for interdisciplinary research in the humanities and social sciences;

• Centre for Cross-Cultural Research, which seeks to enrich scholarly and public understandings of cross-cultural relations and histories, particularly but not exclusively in Australia and in the immediate region and to take a leading role in research on visual culture, and research using visual method;

• The Centre for Molecular Structure and Function, which involves the Research Schools of Chemistry and Biological Sciences, The John Curtin School of Medical Research, and the Faculty of Science, and aims to increase understanding of the relationship between the structure of biological macromolecules and their function;

• The Centre for Bioinformation Science (CBiS) brings together researchers with backgrounds in mathematics, statistics and quantitative biology with the goal of developing a conceptual architecture for an information-based, integrative approach to complex biological systems;

• The Centre for Visual Sciences, which involves staff of the Research Schools of Physical Sciences and Engineering, Biological Sciences, The John Curtin School of Medical Research, and the Faculty of Science in the study of visual processing mechanisms in humans, mammals, insects and computer systems;

• In 2002, the National Centre for Epidemiology and Population Health collaborated with CSIRO, the Bureau of Meteorology and the University of Otago on the study Human Health Climate Change in Oceania: a Risk Assessment;

• The Global Change Confederation, which is giving a higher profile to the established strengths at the ANU in the study of climatic change and human impacts; and

• The Health Sciences Program, which will involve interaction between the Faculty of Science, The John Curtin School of Medical Research, the National Centre for Epidemiology and Population Health, the Centre for Mental Health Research, the University of Canberra and the ANU Medical School, to promote research and training in health sciences.

6.2 Collaboration with Universities and Research Organisations

The ANU as a whole, and the IAS in particular, is committed to a program of mutually beneficial interaction with other Australian universities including:

• Secondments to and from other universities to the IAS, both on an ad hoc basis and as part of advertised programs;

• Collaborative research scholarships to enable research students in the biological and chemical sciences enrolled at other Australian universities to spend between 12 and 18 months of their course at the IAS;

• The provision of course work for PhD students from other universities, e.g. intensive courses of lectures/seminars or intensive summer courses;

• The provision of visiting scholarships for students from other Australian universities undertaking a PhD in Pacific or Asian studies to spend three to six months in RSPAS;

• Collaboration with national and state cultural institutions, in particular the National Museum, the National Gallery and the National Library, in joint research projects, exhibitions, symposia and multimedia projects, eg the recently created Centre for Research and Information Outreach (CRIO) joins the ANU and the National Museum together in an initiative that will result in digital and multimedia productions of key research in the humanities and environmental and social sciences; and

• The provision of half of the costs associated with its staff giving lectures and seminars at other universities.

The ANU collaborates with researchers in universities throughout the world as well as with researchers in Australian universities and research organisations such as the CSIRO. The ANU's Annual Report lists over 1200 research projects involving collaboration with researchers from other universities or research organisations around the World. In the IAS, the formal location within Schools of staff from other research organisations such as AGSO and Telecom was a precursor for the CRC concept. The ANU is currently

working with AIMS to enable maximum use of the North Australia Research Unit (NARU).

The ANU and its Schools and Faculties have many MOUs and Collaborative Agreements to facilitate research collaboration. For example, the Research School of Physical Sciences and Engineering lists the following:

- Samsung Electronics Co Ltd, Korea
- Shanghai Institute of Technical Physics (SITP), Chinese Academy of Sciences
- The Physics Department, University of Pretoria
- Institute of Advanced Energy, Kyoto, Japan
- Tsinghua University, Beijing, China
- The European Union-Australia Science & Technology Agreement, DIST
- Deutscher Akademischer Austauschdienst (DAAD) Exchange Service
- ANU-Engineering & Physical Sciences Research Council Agreement (ANU-EPSRC), UK (The ANU-EPSRC agreement in effect covers a range of UK universities)
- Beijing University, China
- National Institute for Fusion Science, Nagoya, Japan
- Lockheed Martin Energy Research Corporation,
- Oak Ridge National Laboratory, USA
- L'Ecole Polytechnique, Paris, France
- Royal Institute of Technology, Stockholm
- Ericsson Components AB, Stockholm
- British Telecom Laboratories, UK

6.3 Regional Collaboration

The ANU is committed to actively pursue research collaboration in regional Australia. In addition to numerous research collaborations with the ACT Government, local CSIRO Divisions and the University of Canberra, other regional collaborations include:

- Agreement to establish the Canberra Medical School between the ANU, the University of Canberra and the Commonwealth and ACT Governments;
- ARC-SPINT funded projects being conducted by the Research School of Physical Sciences and Engineering and AOFR Pty Ltd (Fyshwick ACT) including a project on the Design, Fabrication and Evaluation of Planar Lightwave Circuits in Organically Modified Silicate Glasses for Telecommunications and Other Applications;
- Collaboration between the Department of Chemistry, Faculty of Science and Australian Water Technology on Surface Characterisation of cryptosporidium oocysts and giardia cysts for the Development of Novel Filtration Systems for Commercial Applications;
- A Special Research Centre in Applied Ethics hosted by The Faculty of Arts in conjunction with the Charles Sturt University. The Centre is engaged in philosophy research and teaching in the Faculty of Arts and the Research School of Social Sciences;
- An ARC-SPINT funded project being conducted by the Research School of Biological Sciences with Charles Sturt University on Rootstock influence on the relationship between vine performance and grape quality;
- A project on Conservation treatments being conducted by the RSC and the Australian War Memorial;
- Research on the Mechanism of cell death in Ross-River virus-infected striated muscle is being conducted by JCSMR and the University of Canberra; and
- Research on Neuronal plasticity in the adult visual cortex is being conducted by the Psychology Division, Faculty of Science and the University of Canberra.

6.4 Industry Interaction and Commercialisation of Research

The ANU encourages research collaboration with industry. It has strong research links with a diverse range of companies, and continuously seeks to expand its industry linkages through participation in the Government's Cooperative Research Centres (CRCs), Collaborative Research Grants and University-Industry Postgraduate Research Award Programs, launching of companies such as Acton Lasers, and attracting other companies such as BlueLab (Taiwan) to set up R&D laboratories on campus.

The ANU is a participant in the following CRCs and Centres of Excellence:

- Australian Photonics CRC
CRC for Landscape Evolution and Mineral Exploration
CRC for Pest Animal Control
Greenhouse Accounting CRC
Tropical Plant Protection CRC
CRC for Functional Communication Surfaces
CRC for Sustainable Production Forestry
CRC for Smart Internet Technology
CRC for Innovative Dairy Products (associate participant only)
National ICT Australia (NICTA)
Centre of Excellence for Quantum-Atom Optics
Centre of Excellence for Mathematical and Statistical Modelling of Complex Systems

Collaborative R&D projects with industry include:
- PI-88 and other oligosaccharides. The John Curtin School of Medical Research (JCSMR) with Progen Industries Ltd;
- Cell cycle genes. Research School of Biological Sciences (RSBS) with Crop Design NV;
- Collaborative chemical screening. Research School of Chemistry (RSC) with Glaxo Smith Kline;
- Cotton fibres. RSBS with Aventis Crop Science and CSIRO;
- Insect Vision & Navigation. RSBS with the Office of Naval Research, USA;
- Seekers & Controllers. RSBS with the Office of Naval Research, USA;
- Epilift. Faculty of Engineering and Information Technology (FEIT) with Origin Energy Retail Ltd;
- Solar trough. FEIT with Solarhart;
- Cellulose genes. RSBS with Groupe Limagrain / Biogemma;
- Phosphosugars. JCSMR with Praxis Pty Ltd; and
- Phytophthora - Novel Control Strategies. RSBS with Rhone-Polenc.

The ANU is also a member of:
- BioZ, the Australian Bioscience Consortium;
- The Canberra Commercialisation Council;
- ATPI, the Australian Technology Park Innovations; and
- Epicorp, the Australian Capital Region’s high technology commercialisation centre.

6.6 Cooperation with Government and other public institutions

The ANU encourages academic staff to give specialist advice and assistance to Federal and State Government departments and to other public institutions, both within Australia and internationally. This help takes many forms - consultancies, membership of committees, involvement in particular projects, secondments, etc. The ANU’s Annual Report for 2001 provides a list of over 500 academic staff involved in such activities. Highlights include:

- The Centre for Tax System Integrity is a specialised research unit within the Research School of Social Sciences set up to extend understanding of how and why cooperation and contestation within the tax system occurs. The Centre has been set up in partnership with the Australian Taxation Office;
- The Australian Centre for Intellectual Property in Agriculture undertakes research in issues relating to intellectual property law, to apply it to the scientific community and industry and rural bodies, particularly in the agri-food sector. The Centre is funded by the Grains Research and Development Corporation and the Commonwealth Government;
- Senior ANU academics serve on a number of public and parliamentary advisory bodies. Professor John Hearn chairs the Australian Biotechnology Council.
- The Centre for Aboriginal Economic Policy Research (CAEPR) is a multi-disciplinary social sciences research centre with a primary focus on indigenous Australian economic policy and policy development issues, including native title and land rights, social justice and the socioeconomic status of indigenous Australians. The Centre is funded by the Aboriginal and Torres Strait Islander Commission (ATSIC), the Commonwealth Department of Family and Community Services and the ANU; and
- The Strategic and Defence Studies Centre aims to advance the study of strategic problems, especially those relating to East Asia and the Pacific. Participation in the Centre's activities is not limited to members of the ANU, but includes other interested professional, diplomatic and parliamentary groups.
7. **Intellectual Property, Commercialisation and Contractual Arrangements**

The ANU actively seeks to manage its intellectual property to maximise its return on investment in research and ensure the transfer of technology for public benefit. Overall responsibility for the management of intellectual property in the ANU rests with ANUTECH and the Research Office, both overseen by the Deputy Vice Chancellor (Research).

7.1 **Strategies for the identification, assessment and protection of IP**

The ANU established ANUTECH Pty Ltd (ANUTECH) to manage intellectual property protection and the commercialisation of research. ANUTECH is a wholly owned subsidiary of the ANU. The company employs skilled staff to work on campus talking to ANU staff to determine their research areas, identify opportunities that may have commercial potential, and discuss opportunities for commercial exploitation of their research. When a project with commercial potential is identified ANUTECH staff undertake an extensive review of patent and publication databases to determine whether the technology is patentable. They also undertake a review of the potential markets for the technology, identify any competing technologies and collating a list of potential commercial partners to be approached during marketing of the technology. Where a technology is complex and beyond the capabilities of the ANUTECH staff, external experts are contracted to undertake a review of the potential opportunity. ANUTECH manages protection of intellectual property with the assistance of external patent lawyers. The company has one position whose responsibility is patent management and management of the databases relating to patents. In addition, where appropriate, business development staff assist in determining issues such as in which countries applications should be lodged and when and how examiner opinions should be addressed. In all cases research staff who are inventors on a patent maintain a constant involvement with the application by assisting in the preparation of responses to examiner opinions. ANUTECH also manages the ANU's portfolio of trademarks and other registered intellectual property.

7.2 **Criteria and processes for the selection of commercialisation strategies**

Determination of an appropriate commercialisation strategy is undertaken by ANUTECH staff in consultation with the researcher and Deputy Vice Chancellor (Research). In general, the nature of the technology, the ongoing interests of the researcher, the potential market for the technology and consideration of potential routes to market and the undertaking and costs required to get a product to market determine the appropriate strategy. Technologies that may be considered "platform technologies", that is they can be applicable to a broad range of applications, will be considered for a commercialisation strategy that involves the formation of a start-up company. In contrast, technologies that are "one product" are more likely to be considered for licensing to a larger organisation, however grouping of technologies together into a "package" for a start-up company is also a considered option.

7.3 **Equity Policy**

The ANU holds equity in a number of start-up companies that have been formed to commercially exploit intellectual property arising from ANU research. Currently there is no "equity policy" but the ANU Investment Office manages the equity obtained by the ANU through commercialisation. Researchers involved in the generation of the research may also hold equity in new company.

7.4 **Strategies to interact with industry partners**

Research staff are encouraged to liaise with industry partners in relation to their research in order to promote areas of common interest and a mechanism for marketing the ANU's research capabilities. Staff are encouraged to apply for government supported linkage programs and the entry of the Institute of Advanced Studies into the ARC in 2001 resulted in a number of successful ARC Linkage Program grants being accepted. In addition the ANU undertakes a number of collaborations with industry partners both nationally including Progen Industries Ltd, Johnson & Johnson Research, Origin Energy Retail Ltd and BP Solar, and internationally, including Glaxo SmithKline, Biogemma, Bayer CropScience, and FEI. As part of its marketing of ANU research to potential commercial partners ANUTECH holds regular meetings with potential investors and industry representatives to discuss technologies with potential commercial application. ANUTECH is also an integral part of an initiative between Unisearch (University of NSW), the Business Liaison Office (University of Sydney), University of Technology Sydney and the Australian Technology Park-Innovations called *from Bench to Business*. The aim of the initiative is to enable access for
potential partners in industry and investment communities to new technologies by providing an opportunity for the commercial arms to showcase technologies to this audience. ANUTECH also participates in industry sponsored partnering forums such as the AusBiotech annual conference.

7.5 Ownership of Intellectual Property (IP)

The ANU’s policy on IP aims to protect the ANU’s rights to IP generated at the ANU, having regard for the rights of staff and students and appropriate reward for creativity and endeavour. The ANU IP Policy requires that staff and students take appropriate steps to protect the ANU’s IP. Under the policy IP generated by staff in the course of their work is owned by the ANU. ANU does not claim ownership of copyright except under particular circumstances as set out in the policy.

Under the ANU IP policy students own IP generated by them in the course of their studies. In circumstances where the ANU may seek to commercially exploit intellectual property generated by students it will ask students to assign their IP to the ANU and the student will then be recognised under the distribution scheme for the sharing of financial benefits of commercial exploitation.

7.6 Incentives to staff to encourage research commercialisation

The ANU IP Policy contains provision for sharing of net income received as a result of commercialisation of research results. In general terms originators of commercialised research stand to gain one third of net income. Where the route for commercialisation is through the formation of a start-up company individual researchers will often receive benefit through direct shareholdings in the new company. A staff member who wishes to become a director of a company must first obtain approval from the Finance Committee, who will consider the application in light of whether the activities proposed would be contrary to the broad interests of the ANU, any potential conflicts of interest and the good standing of the business activity or company. In taking up a position as director or adviser to a company a staff member must comply with the ANU’s Conflicts of Interest policy.

7.7 Intellectual Property Policy

The ANU revised its Intellectual Property guidelines in late November 2002. There are now four policies relating to Intellectual Property and conflict of interest:

- Company Directors, Secretaryships and Partnerships
- Conflict of Interest and Commitment.
- Intellectual Property: Ownership, Protection and Commercialisation
- Use of the ANU’s name and insignia

PART B

(i) Areas of research strength: research students (EFTSU) in 2002
### All areas of research

<table>
<thead>
<tr>
<th>Area of Research</th>
<th>Total HDR students</th>
<th>HDR commencing students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science &amp; technology</td>
<td>497</td>
<td>113</td>
</tr>
<tr>
<td>Health &amp; medical research</td>
<td>96</td>
<td>25</td>
</tr>
<tr>
<td>Arts, humanities &amp; social sciences</td>
<td>592</td>
<td>159</td>
</tr>
<tr>
<td>Total, all areas of research</td>
<td>1184</td>
<td>297</td>
</tr>
</tbody>
</table>

### Areas of research strength only

<table>
<thead>
<tr>
<th>Area of Research</th>
<th>Total HDR students</th>
<th>HDR commencing students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia and the Pacific (incl. Indigenous Studies)</td>
<td>187</td>
<td>47</td>
</tr>
<tr>
<td>Bioscience</td>
<td>109</td>
<td>21</td>
</tr>
<tr>
<td>Environment</td>
<td>81</td>
<td>17</td>
</tr>
<tr>
<td>Economics and Business</td>
<td>52</td>
<td>27</td>
</tr>
<tr>
<td>Engineering and Information Sciences</td>
<td>81</td>
<td>25</td>
</tr>
<tr>
<td>Government and Law</td>
<td>52</td>
<td>16</td>
</tr>
<tr>
<td>Humanities</td>
<td>182</td>
<td>40</td>
</tr>
<tr>
<td>Health and Human Sciences</td>
<td>110</td>
<td>27</td>
</tr>
<tr>
<td>Physical Science</td>
<td>199</td>
<td>46</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>99</td>
<td>23</td>
</tr>
<tr>
<td>The Arts</td>
<td>35</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total Areas of Research Strength</strong></td>
<td><strong>1184</strong></td>
<td><strong>297</strong></td>
</tr>
</tbody>
</table>
(ii) **Areas of research strength: research income in 2002 ($000)**

[Note: this data based on ANU HERDC submission 30 June 2003]

<table>
<thead>
<tr>
<th>All areas of research</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science &amp; technology</td>
<td>15 102</td>
<td>6 052</td>
<td>8 067</td>
<td>2 998</td>
</tr>
<tr>
<td>Health &amp; medical research</td>
<td>8 055</td>
<td>3 470</td>
<td>6 555</td>
<td>0</td>
</tr>
<tr>
<td>Arts, humanities &amp; social sciences</td>
<td>7 120</td>
<td>4 063</td>
<td>5 851</td>
<td>0</td>
</tr>
<tr>
<td>Total, all areas of research</td>
<td>30 277</td>
<td>13 586</td>
<td>20 474</td>
<td>2 998</td>
</tr>
</tbody>
</table>

### Areas of Research Strength

| Asia and the Pacific (incl. Indigenous Studies) | 1 846 | 2 899 | 2 725 | 0 |
| Bioscience                                    | 5 872 | 1 062 | 2 529 | 980 |
| Environment                                    | 1 444 | 232   | 193   | 0 |
| Economics and Business                        | 777   | 771   | 496   | 0 |
| Engineering and Information Sciences          | 868   | 328   | 2 023 | 137 |
| Government and Law                            | 1 113 | 500   | 693   | 0 |
| Humanities                                    | 2 855 | 39    | 305   | 0 |
| Health and Human Sciences                     | 7 710 | 2 687 | 5 727 | 0 |
| Physical Science                              | 6 918 | 4 430 | 3 322 | 1 881 |
| Social Sciences                               | 807   | 622   | 2 461 | 0 |
| The Arts                                      | 68    | 5     | 0     | 0 |

**Total Areas of Research Strength**

|                         | 30 277 | 13 586 | 20 474 | 2 998 |
### Research strength: research active staff in 2002

<table>
<thead>
<tr>
<th>Areas of Research</th>
<th>Number of staff who generated research income</th>
<th>Number of staff who generated publications</th>
<th>Number of staff eligible to supervise HDR students</th>
<th>Staff who supervised HDR students as principal supervisors</th>
<th>Individuals who supervised HDR students as associate supervisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>All areas of research</td>
<td>495</td>
<td>1394</td>
<td>910</td>
<td>641</td>
<td></td>
</tr>
<tr>
<td>Science &amp; technology</td>
<td>276</td>
<td>792</td>
<td>367</td>
<td>285</td>
<td>Not Available</td>
</tr>
<tr>
<td>Health &amp; medical research</td>
<td>67</td>
<td>168</td>
<td>72</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Arts, humanities &amp; social sciences</td>
<td>152</td>
<td>434</td>
<td>471</td>
<td>293</td>
<td></td>
</tr>
<tr>
<td>Total, all areas of research</td>
<td>495</td>
<td>1394</td>
<td>910</td>
<td>641</td>
<td></td>
</tr>
<tr>
<td><strong>Areas of Research Strength</strong></td>
<td></td>
<td></td>
<td>Breakdown Not Currently Available</td>
<td>Breakdown Not Currently Available</td>
<td></td>
</tr>
<tr>
<td>Asia and the Pacific (incl. Indigenous Studies)</td>
<td>67</td>
<td>163</td>
<td>126</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bioscience</td>
<td>73</td>
<td>182</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>38</td>
<td>52</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics and Business</td>
<td>14</td>
<td>47</td>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering and Information Sciences</td>
<td>25</td>
<td>100</td>
<td>57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government and Law</td>
<td>19</td>
<td>65</td>
<td>65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities</td>
<td>32</td>
<td>106</td>
<td>82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and Human Sciences</td>
<td>69.5</td>
<td>175</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Science</td>
<td>135</td>
<td>444</td>
<td>207</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Sciences</td>
<td>19.5</td>
<td>53</td>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Arts</td>
<td>3</td>
<td>8</td>
<td>69</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Areas of Research Strength</strong></td>
<td>495</td>
<td>1394</td>
<td>910</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Level B and above academic staff.
2. This includes students for 2002 and preceding years of enrolment.
3. Detailed data not available due to migration from previous student system to new system.
(iv) Quality of research training experience

Table (iv) Qualities of staff who supervised HDR students in 2002

<table>
<thead>
<tr>
<th>Share of supervising staff (%)</th>
<th>Share of supervising staff (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The share of supervisors who hold research qualifications</td>
<td>91¹</td>
</tr>
<tr>
<td>The share of supervisors who undertook formal supervisor training in the year</td>
<td>10</td>
</tr>
<tr>
<td>The share of supervisors who have supervised HDR students to completion in the year</td>
<td>44²</td>
</tr>
</tbody>
</table>

¹ Partially estimated due to the limitations of available data as a consequence of the implementation of a new human resources management system.
² Number of supervisors who have supervised to completion - others may have been involved at earlier stages.
<table>
<thead>
<tr>
<th>Research Priority Area</th>
<th>Research Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Arts</td>
<td>Visual arts</td>
</tr>
<tr>
<td></td>
<td>Music</td>
</tr>
<tr>
<td></td>
<td>New media arts</td>
</tr>
<tr>
<td>Asia and the Pacific</td>
<td>Asia-Pacific regional research</td>
</tr>
<tr>
<td></td>
<td>Asia-Pacific history, society, religion and natural resources</td>
</tr>
<tr>
<td></td>
<td>Asia-Pacific economics, politics and strategic security</td>
</tr>
<tr>
<td></td>
<td>Asia-Pacific communication and culture</td>
</tr>
<tr>
<td>Bioscience</td>
<td>Molecular structure</td>
</tr>
<tr>
<td></td>
<td>Cell biology</td>
</tr>
<tr>
<td></td>
<td>Biology of organisms</td>
</tr>
<tr>
<td>Economics and Business</td>
<td>Global issues and economic performance</td>
</tr>
<tr>
<td></td>
<td>Corporate governance, management and performance</td>
</tr>
<tr>
<td></td>
<td>Risk identification, measurement and management</td>
</tr>
<tr>
<td></td>
<td>Economic theory and econometrics</td>
</tr>
<tr>
<td>Engineering and Information Sciences</td>
<td>Information technology</td>
</tr>
<tr>
<td></td>
<td>Communication technology</td>
</tr>
<tr>
<td></td>
<td>Materials and manufacturing</td>
</tr>
<tr>
<td>The Environment</td>
<td>Environmental Science and Resource management</td>
</tr>
<tr>
<td></td>
<td>Environmental technologies</td>
</tr>
<tr>
<td></td>
<td>Society and the environment</td>
</tr>
<tr>
<td>Government and Law</td>
<td>Governance</td>
</tr>
<tr>
<td></td>
<td>Law and regulation</td>
</tr>
<tr>
<td></td>
<td>Public policy</td>
</tr>
<tr>
<td></td>
<td>International relations</td>
</tr>
<tr>
<td>Health and Human Sciences</td>
<td>Molecular, cellular and Physiological basis of human health and disease</td>
</tr>
<tr>
<td></td>
<td>Psychology and mental health</td>
</tr>
<tr>
<td></td>
<td>Population health and epidemiology</td>
</tr>
<tr>
<td></td>
<td>Clinical research</td>
</tr>
<tr>
<td>The Humanities</td>
<td>The peopling of Australia</td>
</tr>
<tr>
<td></td>
<td>Impact of globalisation</td>
</tr>
<tr>
<td></td>
<td>Documentary film and narrative</td>
</tr>
<tr>
<td>Indigenous Australia</td>
<td>Sustainable Community Development</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
</tr>
<tr>
<td></td>
<td>History and Indigenous and Australian Identities</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>The physics and chemistry of matter, interactions and systems</td>
</tr>
<tr>
<td></td>
<td>Mathematical theory and tools</td>
</tr>
<tr>
<td></td>
<td>Earth and space sciences</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>Social and environmental sustainability</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Democratic renewal and reform</td>
</tr>
<tr>
<td></td>
<td>Regional population dynamics and cultural identities</td>
</tr>
</tbody>
</table>
Chapter 3: The Quality of Research Training

ATTACHMENT B

The University Research Committee

The Research Committee was established to advise on and implement the research policies of the University.

The Research Committee may, within a strategic policy framework approved by the Council, make recommendations to the Board on the following matters or, if the Council so directs, determine those matters on behalf of the Council:

(a) the research priorities of the University, having consulted relevant Heads of Research Schools, Deans of Faculties Directors of University Centres;
(b) the means by which the University’s research performance may be maximised;
(c) research training, in consultation where appropriate with the Graduate Degrees Committee;
(d) the University’s statutory reporting requirements on research;
(e) quality assurance in relation to research policies and programs.

The Research Committee may:

(a) refer a matter to a Research School, the Institute of the Arts, a Faculty or University Centre for consideration and report;
(b) request a head of a Research School, the Institute of the Arts, a Faculty or University Centre to provide such information as the Committee requires on the academic operation and activities of that area;
(c) establish subcommittees or such other committees as it determines;
(d) provide comments to the Academic Board, and through the Board to the Council, the Finance Committee or the Vice-Chancellor on policies relating to the allocation of University resources.

The Research Committee must provide advice and reports to the Academic Board, as the Board directs, on matters relating to the Committee’s functions.

Constitution of Research Committee

The Research Committee consists of the following members appointed by the Council:

- the Deputy Vice-Chancellor (Research);
- the Dean of the Graduate School;
- 2 nominees of the Postgraduate and Research Students’ Association nominated by that Association, one being a postgraduate student in the sciences research stream and the other being a postgraduate student in the humanities research stream;
- the President of the ANU Students’ Association Inc., or his or her nominee;
- 5 members of the academic staff of the University elected from the members of the Board of the Institute of Advanced Studies, 2 of whom are Heads of Research Schools;
- 3 members of the academic staff of the University elected from the members of the Board of The Faculties and the members of the Board of the Institute of the Arts, 1 of whom is a Dean or Director;
- 1 member of the academic staff of the University Centres nominated by the Vice-Chancellor after consultation with Directors of University Centres;
- 2 persons nominated by the Vice-Chancellor after consultation with Deans and Directors;
- 1 member of the general staff elected from the members of the Board of the Institute of Advanced Studies.

The term of appointment of each nominated or elected member of the Committee is to be as set out in the instrument of appointment.

The Vice-Chancellor is an ex officio member of the Research Committee and may be represented at meetings of the Committee by the Deputy Vice-Chancellor.
Note: The following officers are also expected to be in attendance at meetings of the Research Committee:

- Head of the Research Office
- Deputy Vice-Chancellor (Education)
- Pro Vice-Chancellor (Academic Development and Information Services)
- Director, Scholarly Information Services.

**Chair of Research Committee**

The Deputy Vice-Chancellor (Research) is the Chair of the Research Committee.
Climate Change and Health in Australia
Droughts and bushfires remind Australians of the hazards of climatic variation - a concomitant of global warming. Staff from the National Centre for Epidemiology and Population Health, ANU, working with CSIRO and the Bureau of Meteorology, has conducted a pioneering assessment of the likely adverse health impacts of climate change within Australia over the coming half century. Computer models show how mosquito-borne infectious diseases, diarrhoeal disease, heatwave-associated deaths, and the hazards of coastal and inland floods will affect Australians in future.


Diabetes Gene
Researchers at the John Curtin School of Medical Research have identified a defect in a gene called Aire that leads to a rare but devastating form of diabetes. The Canberra research team, led by Professor Chris Goodnow, in collaboration with researchers in Finland, took advantage of the fact that the Aire gene is almost identical in humans and mice. Using genetically engineered mice, they were able to trace the formation of immune cells called T cells that are produced in the thymus gland. Some of these T cells carry receptors against proteins made in the insulin-producing cells of the pancreas, and these "forbidden clones" are normally destroyed before they can leave the thymus, so that they cannot attack the pancreas. When the Aire gene is defective, however, these forbidden cells fail to be destroyed and circulate through the body, setting the stage for a subsequent attack on the pancreas. The identification of defects in this mechanism for purging forbidden T cells will focus research on developing ways to detect and correct abnormalities at different points in the purging process, to prevent diabetes from starting or progressing, and to attempts to cure the disease by pancreas islet cell transplantation.

Adrian Liston, Sylvie Lesage, Judith Wilson, Leena Peltonen and Christopher C. Goodnow, Nature Immunology, March 3, 2003. (http://www.nature.com/natureimmunology)

The Asian Fore-Arc Prehistory Project
The prehistoric transformation of Asian continental populations into island peoples occurred first and most comprehensively in the Asian fore-arc of large islands extending from Japan to New Guinea. Investigations show that some islands were colonised very early, including Timor more than 30,000 years ago, and that the whole regions experienced a major change with an expansion of Asian farming, beginning about 6000 years ago. Current results suggest that there was southward movement of Taiwanese farmers into the Philippines, but substantial amalgamation with local populations in New Guinea before further colonisation of the Pacific.


The Power of Institutions: Political Architecture and Governance
The Power of Institutions opens up the study of political institutions in developing countries. It has long been understood that the way major political institution are structured has big consequences in advanced industrial democracies, but little thought has been given to the more varied and volatile world of politics in developing countries. Using examples from Southeast Asia, this study shows how the design of political systems concentrates or disperses decision-making power and the ways in which this directly shapes overall patterns of governance.

Andrew MacIntyre is Director of Asia Pacific School of Economics and Management, ANU. (Andrew.MacIntyre@anu.edu.au)

Reshaping International Law
This research examines the way that international lawyers tend to focus on crises as the mechanism for the development of international legal principles. It analyses the reactions of international lawyers to NATO's intervention in Kosovo in 1999 as a case study of this tendency and argues that the crisis focus impoverishes the discipline of international law. The article proposes the idea of an 'international law of everyday life' as an alternative. One example of this would be the development of international legal relating to poverty.

Professor Hilary Charlesworth is Director of the Centre for International and Public Law, Faculty of Law, ANU. (CharlesworthH@law.anu.edu.au)

Rethinking Intellectual Property
What is a coherent philosophy of intellectual property rights? There is a sound philosophical foundation for respecting intellectual property, but not for one that endlessly expands the scope of such rights and imposes on the rest of the world standards that only make sense for the United States and the European economic powers. Interest-based bilateral trade negotiations between the US and other nations, as opposed to evidence-based multilateralism, are diagnosed as the source of an emerging incoherence in intellectual property regimes.

Peter Drahos and John Braithwaite 2002 Information Feudalism, Earthscan, London. Drahos and Braithwaite's recent work on global regulation won prizes in 2002 in the American Sociological Association and the Socio-Legal Studies Association. John Braithwaite and Peter Brahos are both Professors in Law, Research School of Social Sciences, ANU. (John.Braithwaite@anu.edu.au)

Corals testify to causes of Great Barrier Reef deterioration
Geochemical signatures in corals preserve a large range of environmental and climatic proxies. We have obtained clear evidence that sediment fluxes into the Great Barrier Reef (GBR) increased five to tenfold after 1870 - immediately following the beginning of European settlement (McCulloch et al., 2003). This supports new government initiatives to reduce sediment and nutrient loads to the GBR, both of which can have deleterious effects on coral reefs.

Malcolm McCullock is a senior researcher in the Research School of Earth Sciences, ANU. (Malcolm.McCulloch@anu.edu.au)

Pan Evaporation
It has been shown that pan evaporation has been steadily decreasing at regional and global scales. The decline in evaporation can be explained by a large decrease in sunlight resulting from an increase in cloud cover and concentration of aerosols. These findings have important implications for prediction of plant responses to global climate change.

Roderick, ML and Farquhar, GD 2002 The cause of decreased pan evaporation over the last 50 years. Science 298: 1410-1411.
Professor Graham Farquhar is Group Leader of the Environmental Biology Group, Research School of Biological Sciences, ANU. (Graham.Farquhar@anu.edu.au)

The Oldest Star in the Galaxy
The astronomers of the Research School of Astronomy and Astrophysics at ANU have found a star that was one of the very first to form in our Milky Way galaxy. This star, called HE0107-5240, has almost no elements other than hydrogen and helium. Its metal abundance is less than 1/200,000 of the amount found in the Sun. It formed so long ago that most of the chemical elements had only just begun to be synthesised. The discovery of this star shows that our Galaxy began to form from an almost pristine sample of matter left over from the Big Bang.

Professor Michael Bessell is an astronomer at the Research School of Astronomy and Astrophysics at ANU. He is an international authority on the chemical properties of stars. (bessell@mso.anu.edu.au)

Surpassing the standard quantum limit for imaging using optical non-classical multimode light. Light and laser beams are used for a multitude of features of our modern life: communication (telefon), data storage (CD and DVD), and images (CCD cameras). We are exploring improvements of these applications based on fully using the quantum nature of light (photons) and the wave nature of atoms. This can make the technology faster, more precise and will allow applications which were science fiction until recently, such as teletransportation.


Hans-A Bachor is a Federation Fellow and Research Director of the Australian Centre of Excellence for Quantum Atom Optics at ANU. (hans.bachor@anu.edu.au)

**Photonic Crystals for All-Optical Technologies**

Information is playing an increasing role in the modern society. Operation of current network devices is based on a slow conversion of optical pulses to electronic signals. However, the network performance would be enhanced enormously provided the repeated conversions are avoided. The future of all-optical networks is based on the physics of photonic crystals, novel composite periodic dielectric materials that provide unique ways of controlling many aspects of electromagnetic radiation. Photonic crystal technology promises creating all-optical analogs of transistors that will one day enable building of the first all-optical computer.


Professor Yuri Kivshar is a Federation Fellow of the Australian Research Council, Professor and Head of the Nonlinear Physics Group (http://wwwresphsse.anu.edu.au/nonlinear) at the Research School of Physical Sciences and Engineering at ANU. (ysk124@rsphysse.anu.edu.au)

**Oil and water do mix!**

It is well known that oil and water do not mix. However, in a recent, surprising study it has been clearly demonstrated that this is only true because of the presence of dissolved air. Removal of these gases causes the spontaneous dispersion of fine oil droplets in water. This discovery has created world-wide interest, not least because of its potential commercial applications in drug delivery, food dispersion and cosmetics.


Richard Pashley is a Professor in the Department of Chemistry, Faculty of Science, ANU. (richard.pashley@anu.edu.au)

**Country of the Heart: An Indigenous Australian Homeland**

The book *Country of the Heart: an Indigenous Australian Homeland* is an unique exploration of the relationships between an Aboriginal clan and their homeland and how it contributes to developments in knowledge in the areas of Indigenous Ecological Knowledge, Sense of Place, Ecological Restoration, and Aboriginal History.


**Seeing the Centre: The Art of Albert Namatjira 1902 – 1959**

This stunning exhibition opened in Alice Springs in July 2002 to coincide with the centenary of Namatjira's birth. The exhibition then travelled to the Australian National Gallery in Canberra and during 2003 will visit the Art Gallery of South Australia, the National Gallery of Victoria and the Queensland Art Gallery. The exhibition comprises a unique collection of Namatjira's finest watercolour paintings. Alison French of the Centre for Cross-Cultural Research has for the past two years undertaken extension research for the Seeing the Centre exhibition catalogue. Produced by the Australian National Gallery the catalogue has subsequently won
three awards - one gold medal in the Queensland Printing Industries Craftsmanship awards for Catalogues and one silver medal for Art Reproduction; and one gold medal at the National Print Awards in the category of limp bound books.


Ms Alison French is currently a Visiting Fellow in the Centre for Cross-Cultural Research, ANU and during preparation of the catalogue was hosted by the Centre as the inaugural Darling Author Fellow and funded by the Gordon Darling Foundation.

(alison.french@anu.edu.au)

Academic Motivation in Australian Universities

Universities, as professional public service organisations, require high levels of academic work motivation to facilitate the efficient and effective provision of personal and labour intensive services to the community. Studies of corporate reforms across the higher education sector indicate poor academic morale and declining commitment in universities. A large-scale survey of the academic work environment in Australian universities was carried out to identify factors that motivate and demotivate academics. Across the sample, academics reported moderate levels of work motivation. Work motivation was found to be relatively strong at professorial levels but weak at lecturer levels. Qualitative and quantitative findings indicated the work environment in academe is motivating when roles are clear, job tasks are challenging, and supervisors exhibit a supportive leadership style. The work environment is demotivating where there is role overload, low job feedback, low participation in decision making, and poor recognition and rewards practices. Results of structural model comparisons indicated the immediate work environment (i.e. job challenge, task identity, supportive leadership) exerts a more powerful influence on the work attitudes and job performance of academics compared to organisation structure factors and changes to the Australian higher education sector.


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The ANU is a teaching and research university; but it is different from many others. It has a degree of research intensiveness that makes it unique within Australia. This provides the ANU with the opportunity to develop educational programs that draw from a distinctive campus culture – a pervasive culture of curiosity.

Students of the ANU can be exposed to programs that draw their content from the edges of knowledge in a field that is revealed, not eventually from remote authors, but by the work of practitioners on the same campus. Students can attend seminars and workshops given by these staff, and be influenced by them, even though they might have no formal contact with them as teachers.

Perhaps the best summary of the educational culture to which the ANU aspires was given by a former student of the University. In a confidential survey four months after graduation, on being asked to identify the best aspects of his or her education, the graduate replied concisely: "Intellectual stimulation; freedom to explore ideas; being taught by the best".31

In 2000, the ANU set about planning its future position in Australian higher education. The key strategic goal for education at the ANU that was determined from that time was that:

The ANU will equip its graduates with the attributes and skills that will enable them to take their place among their peers from the world’s top universities; ANU degrees and diplomas will thus draw from, and be based on, high internationally-benchmarked levels of scholarship.

To ensure that its own objectives could be met, and that the university was well positioned within the changing context of Australian higher education, the ANU conducted a comprehensive Review of undergraduate education during 2002. In scale and significance, that Review foreshadowed the current Review process.

The report of the Review of Undergraduate Education, the recommendations it contained, and the consequences flowing from it have been a major focus of all relevant parts of the University since its release and adoption by the University. It was conducted in parallel with the development of the strategic plan ANU to 2005, and was the most significant element in shaping the education strategy laid out in that document.

The best way to present an overview of the quality of education at the ANU is through an account of that Review, and an assessment of the success of its implementation. Therefore, an edited and summarised version of the Report is the basis of this chapter. Nearly two years have passed since the report was published. This is long enough for the progress in meeting the goals laid out in 2002 to be measured. Following each important issue raised in the 2002 report is an outcomes statement for 2004. This uses statistical information, survey results, and an independent report by ANOP on the quality of education at the University to assess the University’s record in education over the last two years.

In the second half of 2004, the ANU will conduct a Review of postgraduate education of a similar scale to the 2002 Review of undergraduate education. Together with the research quality Review conducted in the first half of 2004, these three Reviews comprise a comprehensive and robust evaluation of the ANU’s performance in all the major areas of its academic activity.

31 2003 Course Experience Questionnaire. BA (Sociology/Political Science) graduate.
THE 2002 REVIEW OF UNDERGRADUATE EDUCATION

In 1960 the Australian National University accepted responsibility for undergraduate education, along with an expectation that the highest standards of education would be achieved. Over the years, the University has developed strong, research-led programs in the fields of fundamental learning, professional training and contextual studies. The University’s primary educational objective is to be the university of choice for the most able students nationally and internationally, while also being strongly attentive to its educational role within the national capital.

In March 2002 the Education Committee commissioned a Review to examine all aspects of undergraduate education at the ANU, from admission to graduation. The terms of reference of the Review were broad, including a consideration of University-wide policies on issues such as assessment, combined-degree arrangements, and collaboration with external partners, as well as detailed examination of practices within faculties.32 Central to the entire review process was the question of how to capture and to further the distinctive nature of education at this, Australia’s premier research University.

The Review was timed to coincide with the final development of the ANU’s strategic document, *ANU to 2005*. It also ran concurrently with the Government’s national Review, *Higher Education at the Crossroads*. As such, the Review of Undergraduate Education at the ANU sought to recommend ways in which issues within its terms of reference could contribute to the University’s strategic goals, in a shifting national context for the higher education sector.

A Review Committee was established, representing a variety of levels of academic staff, general staff and students, drawn from across the University’s academic and administrative areas. In the course of an exhaustive five-month review process, the Committee met with representatives of those involved in undergraduate education; received almost one hundred submissions; and considered a wide variety of statistical information, policy documents and opinion papers.

Overall, the Review found much to substantiate the ANU’s reputation as one of Australia’s pre-eminent providers of research-led undergraduate education. Not only does the University continue the excellent provision on which that reputation is based, but also it is in many ways at the forefront of developments that respond to the changing nature of higher education, nationally and internationally.

Nevertheless, such a reputation can only be maintained by continual self-evaluation. The Review identified a number of areas in which undergraduate education at the ANU could further be improved, and its distinctiveness enhanced. The report made seventeen recommendations, in six broad areas covering the terms of reference of the Review. These areas were:

- Admissions
- Flexibility, combination and progression
- Assessment
- Research-led education
- Administration
- Collaboration

The recommendations of the Review of Undergraduate Education were intended to be implemented in the first months of 2003. This timescale was necessary to ensure that these

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32 In this chapter “faculties” is often used to refer to all areas of the University routinely involved in the delivery of undergraduate education. Similarly, “Faculty Deans” refers to any University officer with ultimate academic responsibility for an undergraduate program or programs.
modifications are able to be reflected in publicity material and University documentation, in time for the 2004 recruitment and admissions process.

The greatest responsibility for implementation fell on faculty Deans. In general, the recommendations were underpinned by, and sought to reinforce, the responsibility of Deans to ensure that undergraduate education in their faculty is of high quality, appropriate to the needs of students, and responsive to the strategic goals of the University. Placing the responsibility at the level of the individual Faculty ensured that the University-wide enhancement of education was implemented in a way that respected the distinctive character and needs of individual disciplines, and therefore retained the specialist and diverse nature of education that is one of the distinctive strengths of the ANU.

**KEY ISSUES IN UNDERGRADUATE EDUCATION**

The single question which underpins the various educational issues considered by the Review was "what should be the nature and purpose of undergraduate education at the Australian National University?"

Often, while considering the details of structures and practices in specific areas of the University, or with relevance to particular groups of staff and students, the work of the Review, and submissions to it, engaged specific issues at a level in which that overarching question was not always in the foreground. Nevertheless, in attempting to come up with particular answers to particular key questions, such answers carry conviction only to the extent to which they are based in an understanding of the nature and purpose of education at the ANU in a contemporary, national, context.

For instance, the proportion of Honours study that should be by research rather than coursework can only be determined by considering what an Honours degree is, and what it is for. The extent to which a student studying for a particular named – and as a consequence, seen to be specialized - degree should be able to take courses from across the whole range of courses offered by the University needs to be decided not only with reference to the specialist, professional requirements of that discipline, but also the use students will make of the degree, and where they will go once they have completed it.

Perhaps it is impossible to arrive at a single, overarching definition of the nature and purpose of undergraduate education. Implicitly or explicitly, academic areas of the University often argued this position, on the basis of the range and diversity of disciplines. There is a diversity of academic methods, from photonics to printmaking; a diversity of professional outcomes, from accountant to actor; and diversity in the further study a student might pursue, from a PhD in Vietnamese history at the ANU to a Diploma in IT Applications at CiT.

Students, too, argued that our conception of undergraduate education must reflect diversity. The ANUSA representatives on the Review put the case strongly that undergraduate education at the ANU should recognise that each student is an individual, with their own academic and professional priorities. This recognition requires that informed student choice be a fundamental basis for the structures of curricula. Many submissions to the Review were critical both of the degree of flexibility and choice offered to ANU students, and of the quality of information and advice available to them.

On the other hand, rather than prevent any single definition of the nature and purpose of undergraduate education, this diversity amongst courses and students might in fact provide its basis:

Undergraduate education at the ANU should:
ANU CAPABILITIES AND PERFORMANCE STATEMENT

- reflect the diverse areas of academic excellence of the whole University;
- reflect the diversity of student needs and destinations through maximising flexibility and student choice;
- allow students to engage with a wide range of research-based knowledge and understanding, for the purposes of research training; for the purposes of professional development; and for the sake of knowledge and understanding themselves.

Outcomes to 2004: academic excellence in ANU education.

The three defining characteristics of education at the ANU to emerge from the Review were diversity, a basis in research, and excellence. These were subsequently captured in ANU to 2005:

In education, our primary objective is to become the university of educational choice for the top students locally, nationally and internationally by offering a unique range of research-led degree programs.

The one issue on which there was no debate at all is the importance of high standards of academic excellence in defining what is distinctive about ANU education.

2004 data continue to support this view. A survey of 129 international alumni revealed that the reputation for academic excellence of the ANU as a whole, or of a specific potential supervisor, was by far the most common reason students had chosen to attend the ANU. (Fig. 1)

Fig. 1: Reasons for choosing ANU (international alumni)

The importance of the ANU’s reputation for academic quality in defining its educational identity is borne out by the ANOP Review of educational quality in 2004:

“The ANU is perceived as a prestigious university with a world-class reputation. Its recent ranking as 49th in the world by Shanghai Jiao tong University has strengthened this perception among students, and is the source of some pride. … Students also perceive the ANU as having a strong reputation for high academic standards. They see the ANU as providing a professional, challenging approach to education which requires students to think critically and to strive for standards of excellence.”

ADMISSIONS

The Review considered the ANU’s admissions policies and practices, with a view to enhancing quality of the student intake, and the extent to which existing practice fully responds to a shifting and diverse set of student backgrounds and expectations.

33 All statistical data for this chapter has been provided by the ANU Statistical Services Office, QESS, whose assistance is gratefully noted.
34 ANOP, Quality Review of the ANU, July 2004 p.8
One of the purposes of conducting the Review of undergraduate education was to examine the extent to which undergraduate education at the ANU has responded to the changing nature of higher education in contemporary Australia. It is concurrent with the Government’s own Review at national level, *Higher Education at the Crossroads*.

*One of the most radical transformations in Australian higher education has been the move to a system that sustains mass participation. The number of students enrolled in Australian higher education courses has more than doubled from 357,373 in 1984 to 726,418 in 2001 ... Whilst this expansion brings with it difficult questions about the future financing of higher education, it also raises questions about the purposes of a higher education institution.*

These issues at a national level have important bearing on how the ANU, as the national university, conceives of itself and its students. There is clearly a variety of perceptions around the University as to how the “ideal” ANU student might be defined.

*Are we going to define “quality student”?*  
*Are we going to aim only for students who fit the research-oriented Boyer model?*  
*Are we going to aim primarily for students interested in a professional education?*  
*Are we going to accept a role as a provider of higher education to a wide range of students, not excluding those students whose talents do not suit them to research, nor to the professions, but who could still benefit from a good liberal education?*

Some – in particular, current students – urged that the ANU should not lower UAI entrance scores any further than is presently the case.

*As UAI entrance scores fall, the prestige of an ANU degree is also lessened. Many school leavers measure the worth of a degree by the entrance score. If the ANU is to compete with other universities to attract quality students, we must maintain our entrance requirements.*

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36 Dr C Edmondson, Dept. of Computer Science, FEIT, S7 [Numbers at the end of references refer to the number in the index of submissions to the Review.]
37 ANU Students’ Association, S21
Outcomes to 2004: entry scores

The goal to increase the number of ANU students with high Tertiary Entry Rank was adopted in the strategic plan *ANU to 2005*, and identified as a primary indicator of the success of the enhancement of undergraduate education at the University. This was not simply to maintain the “prestige of an ANU degree”. If the ANU is to genuinely offer academically intensive research-based degree programs, fairness demands that entry to these programs needs to be offered only to those students with realistic expectations of success.

In the two years since the Review, the ANU has demonstrated an upturn in Tertiary Entry Rank of incoming students. TER scores are well above national averages, and – as of 2004 – better than the Group of Eight University average in all but the very highest band.

Fig. 2 gives the percentage all incoming students in each TER band. Data are given for all Australian universities and for the Group of Eight universities (2003), and for the ANU in 2003 and 2004.

There was a decided increase in the percentage of students entering the ANU with a TER of 86 or above between 2003 and 2004, and a balancing decline in the percentages entering with scores of between 70 and 85. At the upper end of the scale, the ANU moved above the Group of Eight average except for students with TERs between 96-100. This may in part be explained by the ANU’s lack of undergraduate-entry medical, dentistry and veterinary schools.

A recurrent feature of arguments that define the “ideal” ANU student is the presupposition that the UAI represents an overarching benchmark of incoming student quality. The Review considered statistics on the entry qualifications of ANU undergraduates. These have remained broadly
unchanged since 1998. In 2001, ANU undergraduates entered by means of the following qualifications (Fig. 1).38

The relatively low proportion of entrants coming directly from secondary school may surprise many. Certainly, most debates about admissions criteria in the wider University revolve around TER processes. The fact that nearly half of the entrants to ANU undergraduate degrees do so by alternative means certainly charges the University to ensure that its entire range of entrance procedures is well-known, efficient, and coordinated.

There are a variety of reasons that underlie the recent increase in alternative modes of entrance to University, and that suggest that this trend will only continue. Admission policies and procedures need to be as flexible as possible, because

> increasingly individuals will be moving in and out of the workforce and formal education as the rate of economic and social change accelerates and individuals need to make big career changes. As well as implying that our education programs need to be flexible, skill focused, modular, articulated (etc), this means that our universities should make it easy for people to move in and out of formal education.39

The Review received many suggestions as to how to ensure that the ANU admissions policies respond to the changing profile of student entry qualifications. The Chair of the Admissions Committee suggested, among others, greater articulation with TAFE courses; the recognition of prior learning in work experience and employment-based training; and the adoption of a less conservative attitude to overseas qualifications.40 Some submissions to the Review stressed the need for a complete overhaul of admissions processes:

> It is essential that we change our admission processes to allow for ‘on the spot’ offers. Deans (or appropriately qualified delegates) should have the authority to admit students, and should take responsibility for that admission … Our competitors do have such processes and we are losing many students who get impatient waiting weeks for the official letter of offer.41

38 Data provided by the [then] Planning and Quality Assurance Office.
39 Dr A Vervoon, Faculty of Asian Studies, S18
40 Dr B Bryce, Chair, University Admissions Committee, S61
41 Dean, Faculty of Engineering and Information Technology, S26
Outcomes to 2004: admissions processes

As a direct result of the Review, admissions processes were streamlined in 2003. Faculty Deans were given final responsibility for the admission of undergraduate and postgraduate students, with the University Admissions Committee given an advisory role. This led to two immediate benefits:

- Direct applicants to the ANU (for example, international students and postgraduate students) could receive a prompt response to their application.
- Applicants with non-traditional qualifications – for instance, those with extensive work-based experience instead of purely academic qualifications - could have their applications directly and quickly assessed by academics with the expertise to make an informed judgement.

An update of the data given in Fig. 3 is illuminating. Fig. 4 gives entry qualifications for 2004. Even fewer students – now less than half – are entering the ANU on the basis of pre-tertiary qualifications. A significant increase has been seen in the number of students transferring either into or within the ANU from other degree programs. This could be seen as evidence of the success of a more flexible, faculty-based approach to admissions.

Since the implementation of the Review, Deans have been able to make direct decisions regarding the composition of the student body in their faculty, thereby meeting the strategic needs of the University. For instance, the ANU has a policy that no more than around 25% of students be international students. Dean of Economics and Commerce was able to take advantage of this increased flexibility, first in 2003 to take advantage of the high international demand for these programs, and then in 2004 to limit this expansion to roughly the ANU target (Fig. 5).
The Review found that the increased variety of previous qualifications and experience possessed by students entering ANU degree programs puts increasing importance on the preparatory courses offered by the University to ensure its entrants have the full range of skills that enable successful progress through tertiary education.

In 2002, the ANU provided a range of programs designed to enable or streamline entry into university. ANUTech provided a one-year pre-degree program, aimed in particular at international students, which had a focus on academic English, enabling Mathematics, information literacy, as well as a variety of electives. The Centre for Continuing Education provided a University Preparation Scheme for prospective students over the age of 21. This scheme focused on the development of generic academic skills, such as critical thinking and essay writing. Several faculties provided first-year courses as “Year 12 Extension” units, enabling ACT students effectively to commence some of their university studies in Year 12. Other programs, such as the UniChe project in chemistry, seek to assist students’ trajectories more holistically from school, to undergraduate education, through to research or employment in the discipline.42

The overall impression created by this diverse range of provision is that, while each is excellent in its own right, the interests of the University as a whole could be served by a greater degree of coordination between them. Several submissions argued in favour of consolidating these programs into one body:

A “virtual” college may not work as well as a real one operating under the auspices of the DVC (Education) and contributing to the new “one ANU” agenda. It should be part of ANU with clear responsibilities to the faculties and close associations with the IEO and SASS. Providers need guidance from the University on its philosophy about preparatory programs and goals for future undergraduate enrolment. ... Under a University Foundation College students of all preparatory programs could be considered to be members of the ANU community."43

42 Prof J White, RSC and Chair, Management Committee, UniChe, and Dr P Reynolds, Coordinator, UniChe, S19
43 Mr J Dash, Centre for Continuing Education, S30
To coordinate and streamline the University’s provision of preparatory programs, the Review recommended the consolidation of all these programs under the umbrella of a University Foundation College. This would be charged with ensuring:

- common pedagogic quality
- common credit arrangements
- a consistent message in advertising, and
- a growing supply of appropriately qualified students into undergraduate programs.

### Outcomes to 2004: ANU College

During 2003, the various providers of pre-tertiary and university preparation courses met and discussed the nature of a consolidated body. This resulted in the formation of ANU College, which was formally constituted in January 2004. ANU College currently has more than 800 enrollments, studying a range of courses from those specifically designed to facilitate entry to the ANU, to vocational courses for students wishing to retain flexibility in their later educational choices.

It is, of course, too early to tell whether the establishment of this single body for university preparation has had an impact on the quality and number of students entering ANU degree programs through this route, as the first cohort ANU College students has not yet completed their programs and commenced their degrees.

### FLEXIBILITY, COMBINATION AND PROGRESSION.

A need for greater flexibility in the way in which the ANU constructs its educational programs was a significant theme in submissions to the Review from both students and staff. This applied to individual courses, majors, and single degree programs, but was perhaps felt most acutely at the level of combined degrees. In certain cases, accommodating the demands of two quite separate structures and practices seems to students an almost impossible task.

The submission from the ANU Students’ Association outlined four guiding principles that they saw as necessary to enhance flexibility in the ANU’s undergraduate programs.

*Any changes in degree structure should encompass the following principles:*

- Maximise student choice;
- Minimise administrative hurdles for staff and students;
- Ensure the quality of ANU degrees;
- Ensure that ANU graduates are desirable employees.44

It is worth highlighting the fact that students consider greater flexibility of choice, and educational breadth, as characteristics that will make graduates more employable. Indeed, one proposal from the Students’ Association submission was that students might be able to choose any available courses, and after three years graduate (perhaps with a “Bachelor of Liberal Studies”) with no specified major or generic disciplinary area.

However, some submissions identified the dangers associated with such an approach.

> We suggest that “maximising student progress” be achieved by greater flexibility in combined degrees, and increased assistance to students to “chart” a plan of undergraduate studies that serves individual needs without compromising the

44 ANU Students’ Association, S21
quality, and the assurance of emerging with the best possible education, inherent in the present system of prerequisites. Unfettered “grazing” across the total offerings of the ANU would not appear to best serve the aim of a quality outcome.45

The Review made a number of recommendations to enhance the flexibility of student pathways, including:

- Reduction of the number of prerequisites for courses, substituting where appropriate “recommended prior learning”
- Exploring the possibility of cross-accreditation of courses between Faculties.

**Outcomes to 2004: Flexibility**

The idea of enhanced flexibility in degree programs became part of the Education strategy in **ANU to 2005:**

*By 2005 we will invest strategically in cross-disciplinary and cross-Faculty educational programs and courses in existing and emerging fields where the ANU has nationally recognised strengths or potential; foster greater interaction across internal structural boundaries for staff and students.*

Accordingly, in 2003 the ANU formed an Undergraduate Programs Committee, with a brief to scrutinize all new course proposals both from the point of view of academic standards, and from the perspective of identifying and establishing opportunities for cross-disciplinary and cross-faculty pathways for students. The committee itself has assumed a role beyond that of merely a gatekeeper – it has become a forum for the discussion and development of innovative and collaborative courses.

The adoption of the philosophy of enhancing cross-Faculty collaboration has already resulted in new educational programs. The Faculty of Economics and Commerce and the Faculty of Asian Studies introduced a joint Bachelor of International Business (Asia) which first recruited in 2004.

Each Faculty reviewed its prerequisite arrangements. However, academic integrity could not be sacrificed simply for flexibility for its own sake. For instance, the Faculty of Engineering and Information Technology “note[d] that professionally and technically oriented degrees inevitably have a strong and sequential development of subject matter, that requires chains of prerequisites through the programs”.46 Similar responses were made by the Faculties of Science and Law.

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45 School of Psychology, S32
46 FEIT, report to Education Committee on the implementation of the Review of undergraduate education, May 2003.
Fig. 6 gives the percentage of student load taken outside the home Faculty in 2003. As an example, Bachelor of Arts students took 29% of their courses outside the Faculty of Arts – either as cross-faculty electives in their single BA degree, or as part of a combined degree program. The data indicate good opportunities for students to develop breadth and choice in their education.\(^{47}\) Fig. 6 demonstrates the range available at the ANU of both breadth and focus.

Student frustration with limited choice was a theme of the 2002 Review. In the 2004 ANOP survey of student attitudes to the quality of ANU education, it was not mentioned among the negatives. Rather,

"The ANU is also seen to offer many educational opportunities, evident in the broad range of course offerings across both undergraduate and postgraduate domains, as well as unique opportunities in specialist courses such as the PhB program."\(^{48}\)

The Review found that undergraduate education at the ANU needed to respond to a variety of changes in student patterns of learning. A shift of pedagogical focus from teaching to learning, the development of learning technologies, and the increasing financial burden on students and the resultant increase in part-time work they undertake all have resulted in pressure to move away from “time-serving approaches to curriculum organisation” towards more “self-paced, mastery-based progression”.\(^{49}\)

Much of this shift towards a more “student-centred” model of learning is encompassed by the research-led nature of education at the ANU. However, it was clear in 2002 that many areas of the University were responding to changing learning contexts, in ways appropriate to specific disciplines. Most had recognized the need to equip students with lifelong learning skills, and a range of generic graduate attributes:

\[
\text{We believe that the University, in establishing the [Information Literacy] Program, recognised that employers now expect the graduates that they employ to have a range of IT and information skills or abilities relevant to their chosen}\]

\(^{47}\) This is also due to the fact that the majority of these students are taking combined degrees, in which cross-faculty study is by definition.
\(^{48}\) \(^{49}\) ANOP, Quality Review of the ANU, July 2004
\(^{49}\) Dr P Mathew, Faculty of Law, S13
profession and/or discipline. While these vary according to the profession, there is also a core of information-related abilities that is needed in any form of employment that a University graduate might enter.  

This shift in learning style places great demands on teaching staff to adapt and to develop their range of teaching skills. The Review concluded that the University needs to place greater emphasis on this aspect of staff development, and to reward more broadly staff who focus on their professional development as teachers.

**Outcomes to 2004: teaching quality**

Partly as a result of the Review, the ANU established a Graduate Certificate in Higher Education, principally aimed at providing a tertiary teaching qualification to existing ANU lecturers. This course began in 2003. The course is designed to be completed part-time over two years. Up to Semester 1 2004, 70 staff have enrolled in the GradCertHE.

Notwithstanding, students’ experience of ANU teaching is very positive and improving. In the national Course Experience Questionnaire given to all graduates of Australian universities, the ANU scores above the national average on the “good teaching” scale:

![Figure 7: Percentage of positive responses on the CEQ “good teaching” scale.]

The ANOP survey of students in 2004 also found students’ to be on the whole extremely positive about the quality of teaching, although there were some variations across the campus:

“The main reason for the high level of students’ satisfaction with their education at the ANU is the teaching quality, which is seen as combining rigorous academic standards with a personal, supportive approach to students. … While teachers expect students to meet a high standard, they are seen as supportive, approachable and readily available to provide personal attention. This strong student focus among teaching staff is thought to be an advantage the ANU has over other major Australian universities.”

The Review proposed the introduction of a teaching and learning code for the University as a whole. The intention of this document was to articulate the expectations of staff, students and the University regarding the practice of teaching and learning. Increasingly, students have been studying diverse combinations of subjects and degrees; with a variety of learning styles in

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50 Information Literacy Program, S55
51 Dr R Baker, SRES, Faculty of Science, S51
52 ANOP, Quality Review of the ANU, July 2004 p.8
classrooms, libraries, information commons, and off-campus; through full-time, part-time and distance learning modes. This diversity is an important strength of ANU’s undergraduate education. A strong but simple University-wide code of educational practice, based upon the University’s rules, regulations and strategic directions, was seen to be needed as a guide both to teachers and students. Codes at other universities include such issues as class preparation, attendance requirements, use of academic support services, academic honesty, academic teamwork, but also a helpful list of “dos, shoulds, shouldn’ts and don’ts”, which reflect the University’s research-oriented ethos and pedagogical preferences.

**Outcomes to 2004: Teaching and Learning Code**

The University adopted a Teaching and Learning Code in 2003. As a consequence of the discussion and deliberations over the content of the code, the ANU also prepared a Code of Practice on Academic Honesty and Plagiarism, which was adopted in late 2003.

Much time in the 2002 Review was spent considering the issue of the definition of a “major” within degree programs, and the extent to which Faculties determined and defined “core” and “elective” course components. Several detailed recommendations were made, establishing consistency for students across the University. However, these essentially constituted “housekeeping” issues.

A related issue, but one of strategic importance to education at the ANU, is that of combined degrees. The ANU leads the nation in the provision of combined degree programs, with nearly half of its students involved in combined programs of some type.

There was broad support presented to the Review for the notion of enhancing the flexibility inherent in combined degree programs. It was clear that the ANU’s position of national pre-eminence in the number of combined degree programs on offer is no accident: many of our course structures (such as those in FEIT) were more flexible already than any in comparable universities, and thus permit combination with other degree programs.53

The Review made a number of recommendations confirming the importance of combined degrees in the education profile of the ANU, and making more consistent the way in which degree structures articulated across the University.

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53 Dean, Faculty of Engineering and Information Technology, S26
Outcomes to 2004: Combined degrees

Since the Review, a number of new combined degree programs have been introduced at the ANU. These include a cross institutional combined degree with a BA from ANU and a BA (Social Work) from the Australian Catholic University. A number of combined degree programs were introduced with the Bachelor of Music; the ANU is now the only institution in the country in which a BMus degree can be taken in conjunction with a degree in Commerce, Psychology or Law.

Student demand for combined degrees remains high:

In all faculties, more than 40% of students are taking combined degree programs, and for Law, Economics and Commerce, and Asian Studies, the figure is considerably higher. Nearly 40% of all ANU undergraduates are enrolled on combined degree programs.\(^\text{54}\)

Quite apart from the various structural barriers to flexible student progression, the Review identified that an important impediment to students taking advantage of the full range of educational opportunities offered by the ANU is the way in which advice and information is provided.

Some faculty advisers were clearly reluctant to suggest or to explain students’ options for taking courses outside their faculty. On submission reported:

> On several occasions, students have actually been talked out of taking a course on which they have set their heart. Why does this happen? Mostly because [faculty advisers] are not well acquainted with courses in other faculties ... \(^\text{54}\)

\(^{54}\) Note that this figure is lower than the figure for any of the individual faculties, as by definition a combined-degree student counts twice in the Faculty figures – once for each faculty contributing to the combined program.
Perhaps we need a policy that encourages (rather than just allows) students to take courses outside of their faculty.\(^{55}\)

This problem is compounded in the case of combined-degree students. Given the number of combined degree programs and their popularity, program advising needs increasingly to be based around the total combined-degree regime of studies rather than the requirements of the two separate programs. The University needs to ensure that combined-degree students do not “feel like the ball in a table tennis game”.\(^ {56}\)

The ANU Students’ Association recommended that the Review should:

investigate implementing a liaison officer for double degree students. Such an officer should be aware of the needs of each faculty and be able to provide clear and correct information to students. The liaison officer should be able to authorize any paperwork that a student may require to make adjustments to his/her degree.\(^ {57}\)

**Outcomes to 2004: combined degree information**

A process for the provision of explicit course advice for combined degree students was agreed in the first half of 2004. It nominates specific faculties to take the responsibility for giving overall advice on progress to combined degree students. This policy awaits final approval by the University.

The Review considered a range of initiatives to improve the experience – in particular the sense of identity and belonging – of undergraduate students, to prevent student attrition. In particular, targeting the resources of academics and support staff towards first-year students could well assist in retaining many students beyond their first year of study.\(^ {58}\)

Many issues that surround the causes of student attrition fell outside the remit of the Review. These include the increase in part-time work, accommodation issues, students’ social networks within and beyond University, and student finances. However, the Review considered whether existing University policies were effective in minimising attrition while maintaining academic standards.

Moves to further extend the choice for students around the structures and combinations of courses have the potential to both enrich and hinder students’ progress through University. The bright, focussed, resourceful student will almost certainly benefit. However, arguably, many students do not combine all three of these characteristics. In particular, many of those that end up contributing to the attrition statistics have been uncertain about the choice of program, course and the possible combinations they can pursue.\(^ {59}\)

It had become apparent that, despite a series of recent changes to the undergraduate student progress rules, the system was still far from optimal. It was not always clear when course coordinators, heads of department and others should intervene with remedial programs for struggling students; nor were students aware of when and how to ask for help. The excellent

\(^{55}\) Dr P Francis, RSAA and Physics, Faculty of Science, S8  
\(^{56}\) Faculty of Asian Studies, S23  
\(^{57}\) ANU Students’ Association, S21  
\(^{58}\) Mr G Hennequin, Co-ordinator, Student Services and Mr M Priddle, Promotions Unit, SRIE.  
\(^{59}\) Dr R Woodward, Head, University Counselling Centre, S43
support offered through programs such as “Phoenix Rising” was optional and student take-up was somewhat haphazard.

Further, there were some problems associated with existing regulations. Students were permitted to re-attempt failed courses indefinitely, as long as permission is given to re-enrol. There was no consistent policy as to the basis on which such permission should be given.

This effectively allows students to remain at University for an indefinite amount of time, regardless of failure. The observation from the Counselling Centre is that this position does not help the majority of the affected students to develop a useful commitment or focus on University. It does not help them to see that University is an experience to be valued. For many, a period of time away from University is often a better solution than a continued experience of failure.60

The Review therefore proposed a tightening of student progression regulations, to enable earlier identification of “at risk” students, and a more effective process for intervention to provide support to continue their studies.

**Outcomes to 2004: student progression**

Progression regulations and procedures were revised in line with the Review recommendations. Fig.9 gives student progress rates at the ANU compared with Group of Eight Universities and the national average:

It is clear why progression was such a concern during the period of the Review in 2002. The ANU progression rates were declining, against National and Group of Eight trends. Clearly, however, the measures adopted after the Review better to support students and manage student progress were effective, as the negative trend for the ANU has been reversed.

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60 Dr R Woodward, Counselling Centre, I16
ASSESSMENT AND ACADEMIC STANDARDS

Many submissions to the undergraduate Review touched on issues to do with assessment across the University. Sensitive areas included clarity of assessment criteria, requirements and practices; parity of marking between faculties, and between similar disciplines at different universities; and the appropriateness of assessment requirements to the educational outcomes of courses. As might be expected, there was in general a marked difference between the submissions of students and University areas on these issues.

In addition to the submissions, the Review considered a great deal of statistical information from the ANU and other universities in an attempt to gain an objective picture of assessment practice. In so doing, the intention was to provide recommendations for University-wide practice rather than to single out specific academic areas for attention.

Some submissions to the Review indicated that the relationship between assessment tasks and learning outcomes was not always clear.

*I have ... noticed that there is an overall emphasis placed on testing rather than teaching. I get the feeling that students are being put in boxes based on their initial marks and there is little room left for improvement (as long as the marks fall along the normal curve).*

The ANU Students’ Association submission to the Review urged that assessment tasks be closely tied to the goals of the course, and that this relationship be made explicit in the information given to students. While ANUSA’s recommendation might be seen to relate principally to issues of transparency in assessment, CEDAM reached the same conclusion on the basis of pedagogical theory.

*The role of assessment in the teaching-learning process is often misunderstood. Far more than a process for gauging students’ performance, the choice of assessment in a course is one of the most powerful teaching-learning tools available to academics. Students look to the course assessment, and to the standards of performance required in meeting assessment benchmarks, to guide them in clarifying what is most important to achieve in the course.*

The proposed teaching and learning code was intended to help to clarify the responsibilities of teachers for defining the relationship between learning and assessment in any particular course. Ultimately, assessment is a measure of how well a student has acquired the attributes of an ANU graduate in a particular degree or discipline. Explicit statements from faculties of assessment criteria, available to students and potential employers will help to make this measure transparent.

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61 Individual student submission, S4
62 ANU Students’ Association, S21
63 Centre for Educational Development and Academic Methods, S36
64 The Review did not attempt to redefine “generic” qualities of an ANU graduate. However, such a statement (perhaps emerging from the Preparing Ourselves document) would be extremely useful in enabling faculties and departments to think explicitly about learning outcomes and thence assessment criteria.
Outcomes to 2004: Linking assessment to outcomes

During 2003 a range of initiatives were put in place asking the academic community to consider the issue of assessment. Seminars were held where university staff - including members of the senior executive, heads of schools, academic staff and students - discussed their view of the nature, role and impact of assessment. Richard James, a prominent national Australian author on assessment was invited to ANU to give two seminars: one directly on assessing student learning, the other on avoiding plagiarism.

Faculty based workshops were also held to discuss the role of assessment within the faculty, and in some cases faculty-wide approaches to assessment, and/or agreement on grade descriptors was reached. The Faculties of Arts, Science, Law, Asian Studies and the School of Music have been particularly pro-active on this topic.

The Undergraduate Program Committee, formed partly as a response to the Undergraduate Review (as noted earlier) also formed that view that in every case the course description supplied in the ANU Handbook would include a description of the proposed assessment, including the nature of the assessment and the weighting of that assessment component within the entire assessment for the course (e.g.: “One 2000 word essay worth 25%”). This requirement, circulated to each academic staff member in the University, and the continued monitoring of this through Undergraduate Program Committee and now the Divisional Education Committees, has considerably increased the consideration of assessment and assessment practices in the University.

The Review considered a large number of data concerning assessment results across the University. It found a wide variation in grading policies, and hence significant differences between departments, schools and faculties in the distribution of grades.

A majority of ANU undergraduate students now study across two or more faculties. They experience radically different grade and Honours distributions. In 2001, for instance, 4 per cent of Law grades were HDs compared to 26 per cent in Asian Studies. One per cent of Arts grades was N, as opposed to 7 per cent in Economics and Commerce. These differences sometimes have a strong justification. They may, for instance, be the result of national benchmarking with similar professional schools. They may result from criterion-referenced as against norm-referenced assessment regimes. Sometimes, however, the justification is not obvious, and the student may be the unintended victim of historical University practice.

By way of example only, the distribution of grades in the Faculties of Law and Arts in 2001 is given below (Fig. 10).  

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65 Data provided by the Planning and Quality Assurance Office.
(A word of caution is necessary in interpreting this table. Given the prevalence of combined degrees at the ANU, many arts students are also law students - and vice versa. This means that analysis of the data is complex, but also that there exists a basis for realistic moderation of grades).

On the face of it the distribution is inexplicable, in that students with higher average entry scores (therefore arguably the better students) are apparently performing worse than the more diverse group in the Arts Faculty. In part, this difference results from norm- as against criterion-based assessment approaches. It could be argued that this discrepancy reflects the different expectations of professional, as against fundamental, learning areas. If this were the case, such discrepancies would be observable in other universities, and to some degree, they are.

In the light of such discrepancies, the Review recommended the explicit introduction of both intra-faculty moderation meetings, and inter-faculty Review and planning meetings. Faculty Deans are now expected to moderate their faculty assessments, and be prepared to account to other Deans for grades awarded.
## Outcomes to 2004: Grade distribution and academic standards

Since the Review concluded, meetings to moderate the final grades allocated to students have been held between the Deputy Vice Chancellor (Education) and the Faculty Deans. A university-wide scaling of academic grades has not been initiated. This is because there is a tension between an internal consistency in mark allocation, and the ANU’s national and international benchmarking of assessment practice and standards against disciplines in other Universities and in relation to the profession.

Most faculties have engaged in an examination of their grading practices and standards. The Faculty of Law has confirmed its grade distribution through consultation with the profession and the standards that the profession wishes to maintain in terms of the performance of law students. The Faculty of Science has conducted a statistical analysis of the distributions of all courses in the Faculty to examine the internal consistency of the grades allocated and the dispersion of grades within and between each of the courses. The Faculty of Arts has developed a set of grade ‘descriptors’ (phrases that explain what each of the grades means in terms of the students’ performance in the subject) and benchmarked that against the other Go8 universities.

Finally, the moderation meeting between the DVC(E) and Deans examines the distributions of grades from each Faculty, department by departments and discusses the standards and parity that emerge from this examination.

There remain differences in the percentages of grades between schools, centres and faculties. Looking across the data from the semester before the Review (semester 1, 2002) to the most recent in which data is available (semester 2, 2003) some departments have made changes, but some have not.

Nevertheless, the ANU is of the view that this tension - between internal consistency, and the different national and international expectations of academic standards within different disciplines - is inevitable and healthy. Certainly, the ANU will make no move towards internal consistency for its own sake if that jeopardizes the high regard in which ANU academic standards are held by students, employers and professional bodies in disciplines as diverse as law, engineering, and the creative arts.

## RESEARCH LED EDUCATION

As a research intensive university ANU’s approach to education has built on its research capacity. A ‘Plan for Growth’ project funded in 2000 articulated this vision in an ‘I(nquiry)-Learning’ initiative. The Review considered considerable analysis of the iLearning project, and of the Boyer model of education in research-intensive universities. Many of the submissions to the Review, in particular the many submissions from areas and staff of the Institute of Advanced Studies, explored the distinctive nature of the ANU’s mix of research and education, and the possibilities this provided for the curriculum. There was a general recognition that not only the research areas of the University, but also the research facilities and collections both within the ANU and readily accessible in national institutions, gave the potential for ANU undergraduates to be provided with a unique set of research opportunities.  

However, the Committee noted:

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66 E.g. Dr S McCausland, University Archivist, ANU Archives Program, S34.
The University needs a core of strong students who will come to complete a degree and leave to find a job. While the prospect of being taught by people with research credibility may impress some of them they are much more interested in being taught well\textsuperscript{67}.

Outcomes to 2004: inquiry-based learning

In 2002 and 2003 University wide which workshops ‘showcased’ the iLearning courses were conducted. Curriculum development explicitly linking research to teaching continued. Many of those nominated for Vice Chancellor’s Awards for Excellence in Teaching described these developments (these are available as a resource document).

However, reports from Faculty Deans to the Education Committee in mid 2003 show that research-led education has extended and become more embedded than the original iLearning project. For example the Faculty of Arts reported not only developments in sociology and archaeology (documented on the iLearning website) but others in Anthropology, ‘internships’ in the School of Humanities and courses in languages and linguistics. The Faculty of Engineering and information Technology also referred to the integrating the University’s Information Literacy Program (nominated in 2004 for an institutional Awards within the Prime Minister’s Awards for Excellence in Teaching) into their courses to prepare students research led learning.

The ANOP report quoted students’ perceptions on ANU’s research-led education:

“\textit{The whole purpose of the course is to develop critical reasoning rather than parroting by rote}” (Law undergraduate).

While some of the students surveyed did not recognise that the teaching they were receiving was research led (“it’s not undergraduate based. It’s aimed at postgrads…”[Economics and Commerce]) they recognised the effects:

“You are learning from someone who’s an expert in that particular field. What could be better than that!” (Asian Studies).

In the Course Experience Questionnaire (CEQ) which surveys students at the completion of their degree program, ANU’s performance on the new ‘intellectual motivation’ scale also supports assertions that the inquiry learning espoused by ANU is successful. Items in that scale were of the type ‘The course developed my confidence to investigate new ideas’ and ‘university stimulated my enthusiasm for further learning’. Of the 1281 graduates in 2002 who responded to the CEQ, 75.1\% ‘agreed’ or ‘strongly agreed’. The national average on the ‘intellectual motivation’ scale is 70.9\%, putting ANU 4\% above the national average. As the iLearning project was only just underway when graduates completed in 2002 this is a promising trend.

Several submissions suggested far-reaching proposals for the blending of research and undergraduate education:\textsuperscript{68}

\textit{The best students entering the University in their first year ... could be permitted to commence their PhD Masters) studies as part of their undergraduate degree. ... The PhD (Masters) work could also count (like an iLearning course) to the undergraduate degree.}\textsuperscript{69}

\textsuperscript{67} Dr P Miller, Director, SASS, S40
\textsuperscript{68} E.g. Dr B Millar, RSISE, S15.
\textsuperscript{69} Dr G.Borg, RSPhysSE, S1
During the term of the Review, a new award – the PhB (Honours) – was proposed and approved by the University. This in fact embodies the spirit of integrating genuine research and undergraduate coursework that characterised many of the submissions to the Review.

### Outcomes to 2004: the PhB

Even as the Review concluded the Faculty of Science introduced the PhB. Its first intake of (the maximum) 20 students was in 2003. All entrants had a TER of 99. These students are allocated individual advisors, and allowed to determine a very flexible and accelerated individual pathway through the degree.

ANOP conducted a focus group specifically of PhB students. The students are aware of the uniqueness of the experience that they have received:

"It's [working directly with research academics in the Research Schools] very specific to the PhB program. It's linked to a research program. In a normal course they wouldn't do that (second year PhB student, Faculty of Science)."

In 2003, the Faculty of Arts and the Faculty of Economics and Commerce also introduced PhB programs, with student cohorts commencing in 2004. This year the Faculty of Asian Studies is requesting approval of a PhB program.

Traditionally, the most research-intensive element of an undergraduate degree is the Honours component. In Australia, the term “degree with Honours” usually signifies that the student has completed an original research project, usually during an additional year of study.

The Review found that there is huge variation across the University in the amount of research and research training involved in the award of degree with Honours. Some degrees (for instance in engineering) award Honours purely on the basis of academic achievement. Others (for instance in law and music) require Honours students to complete separate components within an existing four-year degree. In most cases, Honours is awarded on the basis of academic performance in an additional, fourth year of study. This Honours program usually required some type of research project. However, the relative weight of this project varies, for instance from 12.5% in economics, to 100% in visual arts and some science subjects.

The Committee considered that for a research-intensive university such as the ANU, a percentage research-work component of less than 25 per cent was inappropriate for Honours. This was specified in a recommendation of the Review.

In cases where Honours was not awarded on the basis of a further year of study beyond the pass degree, faculties would need to precisely specify what elements of the degree constituted the “Honours” work and thereby be subject to the minimum 25% research requirement.

The Review also recommended the coordination of expectations and regulations for Honours across the University, initially through the establishment of a single “Honours School” in each Faculty.

Finally, the Review recommended that external moderation of Honours theses

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70 Data collated by the Review secretariat
Outcomes to 2004: Honours

The Faculty of Arts and the Faculty of Science, the two biggest and most diverse of the University’s faculties, have both established single Honours schools. In 2004 The Faculty of Arts is surveying students to establish a measure of student experience of Honours.

The Faculties of Law, Asian Studies and Medicine each already had only one Honours school, and have ensured that the research component within their Honours degrees is a minimum of 25%.

The Faculty of Economics has considered the establishment of a single Honours school for the Faculty but rejected the idea due to the range of professional, fundamental and contextual teaching which occurs in that Faculty. However it revised all Honours programs and now has a minimum 30% research in all programs. This change has been implemented for 2004.

While students have very differing experiences of their Honours year, some report a research experience which is what is desired. For example, in the survey of domestic alumni conducted for the 2004 Review one students said:

"The philosophy and law Honours programmes were two of the best things I did in preparation for postgraduate study."

Time since the Review is too short to show a clear impact of the changes to Honours on later research higher degree enrolment. The ANU has a steady flow of students who, after completing Honours, enrol in a PhD and MPhil at ANU. (They also enrol in research higher degrees in other Universities, of course, but data on these students are much harder to track and an attempt has not been made to assemble it for this Review)

Since 1999, 13% of all ANU Honours graduates have gone on to enrol in a Ph.D or Masters by research degree at ANU.

COURSE MANAGEMENT

During the 2002 Review a large number of submissions concerned the way in which undergraduate education was administered or funded.

There were several problems identified with structures and resources that were seen to have a deleterious effect on the quality of our undergraduate provision. These included funding and timetable issues.

A number of these issues had been identified in the 2001 Review of Administration conducted by McKinnon and Walker, and were under examination at the time of the 2002 Review of Undergraduate Education. McKinnon has conducted a follow up review of administration as part of the current process and a report from that follow up review is available. Therefore, specific details of course management and administration are left to that section.
Outcomes to 2004: Course Management

The focus groups conducted by ANOP for this Review noted ‘administration issues’ and ‘resource negatives’ as ‘minor negatives’ quoting the student who noted:

“I would say anyone who was considering doing part-time at this university to think again – not because of course quality, but because of the administration issues.”

Similar comments about these emerge in the CEQ. For example:

“[A problem was] the study support for part-time mature students. There was no support and no recognition of the particular problems (Anthropology/History)”, and

“[Suggested improvements were] beyond the University’s control: more funding needed so that there are more lecturers and thereby a wider choice of subjects. (English Literature)”.

It would appear that the issues to do with the administration of education that students perceived as problematic in 2002 have not entirely been solved.

COLLABORATION

In the report of the 1995 Review of the Institute of Advanced Studies, the Review committee observed:

There is clear evidence of collaboration between the two elements of the ANU, across a range of activities. However there is also widespread agreement that there remains significant scope for the level and extent of this to increase71

From an examination of the submissions to the 2002 Review, it appeared that the single most pressing issue regarding whole-campus collaboration is the relationship between The Faculties and the Institute of Advanced Studies.

It is apparent that the University must, and seems to be moving closer to an acceptance that it must, utilise the considerable human and information resources of the IAS in delivering undergraduate education. Indeed, it is impossible that the University will prosper, either financially or intellectually, if this unique potential is not fully realised.72

The existence of the Institute of Advanced Studies makes the ANU unique among Australian universities. It is useful, therefore, to compare ourselves with universities in other countries that provide models to which we might aspire.

We should set ourselves the goal of increasing the contact that undergraduates have with the staff and students of the IAS. In visits to the USA I have been impressed with the degree to which outstanding research universities (e.g. Brown, Columbia, Michigan, and Harvard) are able to engage their top undergraduates in the research and teaching activities of the University.73

One recommendation of the 2002 Review recognized that internal collaboration needs to be strongly guided by a set of rules or principles developed centrally for University-wide application.

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71 ARC, Review of the Institute of Advanced Studies, 1996, p.39
42 Dr. S. Dovers, CRES, S6
43 Prof. T. Hull, Demography and Sociology Program, RSSS, S10
Outcomes to 2004: the Divisional structure.

One major change in the University since the 2002 Undergraduate Review has been the identification within the University of two Divisions that integrate the Faculties, Research Schools and Centres. The two Divisions - Science, Health and Engineering on the one hand; Social Sciences, Humanities and the Arts, on the other - combine the research and teaching expertise of the University as a whole.

The two Division Educational Committees have met three times in 2004, with course proposals requiring approval being presented to the respective Divisional planning Committee. The grouping together of academic units from the Faculties and the IAS has encouraged collaboration in education: where that collaboration may not have been occurring, the committee process has ensured further consultation and development.

It is important for the ANU as a whole that any such collaboration does not come at the expense of the research productivity of the IAS.

The Review found that the ANU was already involved in many collaborative teaching arrangements with other institutions. There were recent cooperative developments between the ANU and the University of Canberra and the ACU. In addition, the government’s “Crossroads” Review of higher education addressed – although ultimately did not act on - the importance of articulating joint arrangements with the VET sector, in our case most particularly, CIT. It is likely that the importance of such collaboration will increase in the future, therefore the ANU needs to prepare itself with appropriate measures in place for the efficiency and educational value of such collaborations, always ensuring the maintenance of quality and standards as deserved by ANU students.

One eminent group made the following point:

> The University should not overlook the concept of combined courses [programs] with the Canberra Institute of Technology. Nationally, more students move from higher education into TAFE than from TAFE to higher education. A bachelor degree followed by a TAFE diploma is a simple way to combine theory-based education with a marketable vocational qualification, and it would be strange if attractive combinations could not be devised by discussion between the two institutions.74

Outcomes to 2004: Associate Degree with CIT

Since the Review the first ANU Associate Degree – a partnership between CIT and ANU Faculty of Science - has been developed. ANU is the first of the Group of Eight universities to develop an Associate Degree and its implementation with CIT exemplifies a successful HE/VET collaboration of type recommended by the undergraduate Review. Further Associate Degrees are in planning phase.

The Review found that perhaps one of the biggest areas of potential growth is that of international collaboration.

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74 Em Prof R Johnson, Em Prof D Anderson, Mr C Plowman, S12
Internationalisation is upon us. It is everywhere. In fact, the ongoing process of rendering the university borderless is perhaps the second biggest revolution since the massification of education in the first half of the twentieth century.\textsuperscript{75} 

A number of submissions stress the educational importance of exchange programs. Beyond international exchanges, there is clearly great potential for more articulated institutional collaboration internationally. The ANU is only beginning to recognize the potential offered by new learning and teaching technologies to facilitate international collaboration, both to enrich the experience of our students and to provide a visible international presence for ANU undergraduate education.

The final recommendation of the Review proposed the development of a University-wide policy on inter-institutional collaboration.

### Outcomes to 2004: National and International Collaboration

For 2004, a 'jointly-badged' degree between ANU and the National University of Singapore (NUS) has been developed. The initial discipline offered is Actuarial Studies.

Joint degrees with Charles Darwin University (formerly Northern Territory University) have also been developed and await approval. The link with Charles Darwin University is built in part on research links with ANU having a northern research station associated with Charles Darwin University.

Since the Review, ANU has also explored a major cooperative arrangement with the University of Sydney. It is expected that when finalized, that this agreement could cover the sharing of infrastructure, joint degrees, and joint research projects.

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\textsuperscript{45} Larbi Sadiki, "Internationalising the curriculum in the twenty-first century", CEDAM discussion paper, 2001.
POSTGRADUATE COURSEWORK EDUCATION

The area of postgraduate coursework education is, nationally, one of the most dynamic. In 1999 there were some 96,000 students enrolled in Masters degrees by coursework and other postgraduate programs. By 2003, that figure had risen to 200,000. As well as the traditional destination for recent graduates who wish to extend their disciplinary knowledge and understanding, postgraduate coursework degrees are increasingly being seen as opportunities for professional refreshment by members of the workforce, and as a stepping-stone to research training.

The ANU recognises the need to position itself strategically in the area of postgraduate coursework education. In the second half of 2004, the ANU will conduct a review of postgraduate education of a scale comparable in scope to the review of undergraduate education conducted in 2002. The postgraduate review will examine the nature, role and rationale of the ANU's postgraduate provision; admissions and recruitment practices; academic standards; the management and administration of postgraduate study; opportunities for collaboration; and possibilities for flexibility, combination, innovation and progression within postgraduate education.

The ANU does not wish to pre-empt the findings of the review of postgraduate coursework education by making any strong statements about the nature, purpose or quality of its postgraduate education at this time. Therefore, only the following factual data are presented for the current exercise, to give some measure of the scale of the ANU's postgraduate provision.

A wide range of postgraduate coursework education programs is available at ANU. Generally these involve students in programs involving coursework (and sometimes research), and include the Doctorate by Coursework, the Masters by Coursework, The Graduate Diploma/Postgraduate Diploma, and the Graduate Certificate awards. Postgraduate coursework programs are available in the Faculties and Research Schools and Centres.

Table 1 shows that since 2001, the number of Masters by Coursework students has outstripped the growth of any other postgraduate programs, doubling in enrolments since that time.

Table 1

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<th>Enrolments by Program Type at 31 March, 2001-2003</th>
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<td><strong>Program Career</strong></td>
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### Masters by Coursework Enrolments by Faculty/School/Centre

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<td>467</td>
</tr>
<tr>
<td>NITA</td>
<td>23</td>
<td>16</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>RSPAS</td>
<td>38</td>
<td>28</td>
<td>67</td>
<td>76</td>
</tr>
<tr>
<td>RSSS</td>
<td>19</td>
<td>21</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>Science</td>
<td>47</td>
<td>48</td>
<td>50</td>
<td>45</td>
</tr>
<tr>
<td>(unspecified)</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The largest number of enrolments in a coursework program is in the NGSM where most undertake a Master of International Management, an MBA, or a Master of Management. Law has the next largest enrolments, where the biggest programs are the LLM and the Master of International Law.
**Characteristics of the Graduate Student Body**

**Table 3**

**Postgraduate Coursework Enrolments 2000 - 2004**

Unique Sole/Major enrolment count at 31st of March census date

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CitRes Group at 31 March</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>858</td>
<td>893</td>
<td>1040</td>
<td>1452</td>
<td>1668</td>
</tr>
<tr>
<td>International</td>
<td>315</td>
<td>469</td>
<td>604</td>
<td>787</td>
<td>1060</td>
</tr>
<tr>
<td><strong>Postgraduate Coursework Total</strong></td>
<td>1173</td>
<td>1362</td>
<td>1644</td>
<td>2239</td>
<td>2728</td>
</tr>
</tbody>
</table>

International – International student enrolment has trebled from 315 to 1060 since 2000. At the same time, domestic students enrolling in graduate coursework programs has also doubled from 858 to 1668. Thus, this area of the University has experienced the greatest growth.

**Progress**

**Postgraduate Coursework Progress Rates by program type and Faculty**

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Program Faculty</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctorate by Coursework</td>
<td>SCIENCE</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Doctorate by Coursework Total</td>
<td></td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Master's by Coursework</td>
<td>APSEG</td>
<td>96%</td>
<td>97%</td>
<td>97%</td>
</tr>
<tr>
<td>ARTS</td>
<td>93%</td>
<td>95%</td>
<td>96%</td>
<td></td>
</tr>
<tr>
<td>LAW</td>
<td>92%</td>
<td>93%</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>NCEPH</td>
<td>100%</td>
<td>100%</td>
<td>N/a*</td>
<td></td>
</tr>
<tr>
<td>NGSM</td>
<td>99%</td>
<td>100%</td>
<td>99%</td>
<td></td>
</tr>
<tr>
<td>NITA</td>
<td>89%</td>
<td>91%</td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td>RSPAS</td>
<td>100%</td>
<td>96%</td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td>RSSS</td>
<td>100%</td>
<td>99%</td>
<td>97%</td>
<td></td>
</tr>
<tr>
<td>SCIENCE</td>
<td>98%</td>
<td>94%</td>
<td>99%</td>
<td></td>
</tr>
<tr>
<td>Asian Studies</td>
<td>100%</td>
<td>95%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Economics &amp; Commerce</td>
<td>97%</td>
<td>98%</td>
<td>97%</td>
<td></td>
</tr>
<tr>
<td>Engineering &amp; IT</td>
<td>NA</td>
<td>95%</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Master's by Coursework Total</td>
<td></td>
<td>97%</td>
<td>97%</td>
<td>97%</td>
</tr>
<tr>
<td>Postgraduate Coursework Total</td>
<td></td>
<td>97%</td>
<td>97%</td>
<td>97%</td>
</tr>
</tbody>
</table>

*NCEPH progress data for 2003 are not yet finalized*

Progress rates are generally high in the coursework postgraduate area across all Faculties in the years 2001 – 2003 (above 90).
Completions

Table 5

<table>
<thead>
<tr>
<th>Program Career</th>
<th>Program Type</th>
<th>Year Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate Coursework</td>
<td>Doctorate by Coursework</td>
<td>5</td>
</tr>
<tr>
<td>Master's by Coursework</td>
<td>487  471  737</td>
<td></td>
</tr>
<tr>
<td>GradDip/PostgradDip - New</td>
<td>319  286  292</td>
<td></td>
</tr>
<tr>
<td>Graduate Certificate</td>
<td>20   35   47</td>
<td></td>
</tr>
<tr>
<td>Postgraduate Coursework Total</td>
<td>826  797  1076</td>
<td></td>
</tr>
</tbody>
</table>

The number Masters by Coursework completions has increased from 487 in 2001 to 737 in 2003. The greatest rate of growth has been experienced in Economics and Commerce, Law, NGSM, RSSS and RSPAS.

Focus Group Report

For the 2004 Quality Review, independent consultants conducted interviews with two groups (N = 16 in total) of Masters coursework students who were selected from the six Faculties and key Research Schools and Centres at the ANU. The consultants reported that:

Masters students are also satisfied with the quality of education they are personally receiving at the ANU. However, their level of satisfaction is not as high as that found among undergraduate students. This is in part due to their expectations which are naturally higher or at the postgraduate level and also higher among fee-paying students.

While Masters students believe that they would be unlikely to receive the same quality of education at another Australian university, this is often related to their specialised course content which they feel is not offered at other Australian universities.
Similar to undergraduate students, Masters students believe that the quality of the teaching staff is one of the best things about their education at the ANU, including access to lecturers from other areas of the ANU and overseas guest lecturers.

A specific course design issue for some Masters students is their inclusion within undergraduate courses. They feel this impacts on the quality of the course content they are experiencing and on their class sizes. In these cases, students often feel that their expectations have not been met – and this is the main reason Masters students are not more satisfied overall with their educational experience at the ANU.
CHAPTER 5: THE SERVICE OF THE ANU

One of the strategic aims of the University is to provide intellectual leadership and service to the professions, industry, government and the wider society, nationally and in the local region.

In order to determine the extent of that leadership and service, a range of stakeholders were interviewed by independent consultants ANOP in June 2004. Persons interviewed included senior government officials, heads of research organisations, directors of major national institutions, and senior media representatives. Their views of the role the ANU plays in the Australian community are presented in the appended report. The main findings are:

The interviews reveal a strong and valued professional relationship between stakeholders and the ANU. The relationship is usually multi-faceted, going beyond contact with just one part of the university and reflecting the impact of being in the national capital. Importantly, several stakeholders believe that their relationship with the ANU has strengthened over recent years because of a more proactive attitude on the part of the ANU.76

The contributions of the ANU to national policy development and national debates was highlighted. Stakeholders observed that “ANU researchers and academics are often called upon to comment about a range of current international and national issues”. One suggested that “about half the people advising the Federal Government in one way or another, and the opposition, about the economy come from the ANU”. While some suggested that “the ANU deserves a higher profile and recognition for its existing input”, others see room for further improvement:

The ANU’s contribution to policy is particularly valued when a Research School or Centre has come up with new ideas or approaches, has helped guide policy development with innovative thinking and research, and has helped promulgate the findings and outcomes. Some stakeholders suggest that the ANU can and should do more in this area, by being more proactive and engaging government in their ideas and projects.77

The contributions of the ANU to national development

The quality of ANU service can be inferred from the extent to which others seek to and do make use of it. By way of illustration, the ANU contributes to national development in the following particular ways:

- The Australian National Dictionary Centre at ANU acts as the effective custodian of the Australian English language;
- The Masters of Applied Epidemiology program (MAE) is Australia’s only field-based epidemiology graduate program. MAE students track disease outbreaks around the world — most recently SARS and Bird Flu — and develop containment strategies;
- The Centre for Gambling Research in the Research School of Social Sciences has been established for ten years to investigate problem gambling and strategies to minimise it;

76 ANOP Research Services Pty Ltd, June 2004, Quality Review of the. ANU – Stakeholder Interviews about the ANU’s Community Service Role.
77 ANOP Research Services Pty Ltd, June 2004, Quality Review of the. ANU – Stakeholder Interviews about the ANU’s Community Service Role.
In 2002, The Centre for Aboriginal Economic Policy Research (CAEPR) collaborated with Rio Tinto, the Committee for Economic Development of Australia and a number of Indigenous organisations on the ARC Linkage project, 'Indigenous community organisations and miners: partnering sustainable regional development?';

The ANU was a founding organisation of BIOZ, a consortium of biotechnology companies promoting linkage between business, government and research in the biotech area;

ANU medical researchers serve on numerous government and community health bodies, including the Australian Institute of Sport, the Australian Society of Immunology, the National Board of the Heart Foundation, the Australian Quarantine Inspection Service and the Australian Influenza Vaccine Committee.

The University’s service to the professions

Through its teaching programs, the ANU equips its graduates for careers in a range of professions including accounting, engineering, law and medicine. Postgraduate and professional development courses help add to the skills of Australian professionals. Specific contributions to the professions include:

- The ANU Faculty of Law hosts (after competitive tender) the National Judicial College of Australia, which provides professional development for judicial officers and, on occasion, conducts courses for non-judicial officers;

- The National Institute for Quality Teaching and School Leadership will be established at ANU following an announcement by the Federal Government in June. Its responsibilities include increasing the status, quality and professionalism of teachers and school leaders throughout Australia;

- The ANU Centre for Actuarial Research (CfAR) was established in 2001 to promote quality research into areas of current actuarial interest and fostering important interconnections between the ANU graduate program in actuarial studies and the members of the practicing actuarial profession.

Other centres at ANU aimed at encouraging best practice in the professions through excellence in research include: the Australian Primary Health Care Research Facility; the Australian Centre for Regulatory Economics; and the Australian National Centre for Audit and Assurance Research.

The contribution of ANU to national government

ANU researchers act as consultants to a number of Government organisations such as Environment Australia, National Oceans Office, the Australian Greenhouse Office, Geoscience Australia, the New South Wales National Parks and Wildlife Service and AusAID. ANU researchers are often called on to provide policy advice for different levels of government and regularly serve on government review committees and advisory groups. Recent involvement has included: the Commonwealth Government Review of National Research Priorities; the Academic Advisory Board to the Prime Ministers Taskforce into Housing Affordability; the Oyster Research Advisory Committee; the ACT Bioscience Committee; the Federal Bushfire Research Advisory Group; the Australian Bureau of Statistics Advisory Committee for the Indigenous Social Survey and the General Social Survey; a six-year research partnership with the Australian Tax Office investigating tax system integrity; facilitating workshops reviewing the joint management arrangements at Uluru Kata Tjuta National Park with Environment Australia and traditional owners. The Commonwealth Foreign Affairs Council has a number of ANU researchers as members. Professor Warwick McKibbin serves as a member of the Board of the Reserve Bank of Australia.
Commonwealth Research Project Awards to the ANU, by Government Portfolio - 2002

<table>
<thead>
<tr>
<th>Department</th>
<th>Project Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, Fisheries and Forestry</td>
<td>$10,410,6590</td>
</tr>
<tr>
<td>National Drug Enforcement</td>
<td>$121,803</td>
</tr>
<tr>
<td>Australian National Audit Office</td>
<td>$4,400</td>
</tr>
<tr>
<td>Environment and Heritage</td>
<td>$2,254,924</td>
</tr>
<tr>
<td>Education, Science and Training</td>
<td>$11,172,360</td>
</tr>
<tr>
<td>DEWR</td>
<td>$79,200</td>
</tr>
<tr>
<td>Family and Community Services</td>
<td>$250,749</td>
</tr>
<tr>
<td>Foreign Affairs and Trade</td>
<td>$8,688,342</td>
</tr>
<tr>
<td>Health and Ageing</td>
<td>$16,749,261</td>
</tr>
<tr>
<td>Immigration, Multicultural and Indigenous Affairs</td>
<td>$3,322,100</td>
</tr>
<tr>
<td>Industry, Tourism and Resources</td>
<td>$2,683,520</td>
</tr>
<tr>
<td>Information, Technology and the Arts</td>
<td>$2,891,207</td>
</tr>
<tr>
<td>Defence</td>
<td>$1,964,639</td>
</tr>
<tr>
<td>The Treasury</td>
<td>$3,300,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$63,893,165.52</strong></td>
</tr>
</tbody>
</table>

The contributions of the ANU to informed public discussion

ANU staff are regularly consulted by the media, government, business and community for advice, research and expert analysis on matters of international, national and local importance. ANU researchers are featured in the media almost every day of the year. In 2003, the ANU and/or ANU research was mentioned in more than 10,000 newspaper articles and on more than 4,000 occasions on radio or television. During 2003, the ANU hosted 70 major public lectures, and conducted hundreds of less formal public lectures and briefing sessions. These events are attended by thousands of Australians each year, providing direct access to international leaders, authors, researchers and key decision makers.

Specific examples of public discussion facilitated by the ANU include:

- The National Youth Science Forum, held at ANU in January each year, helps shape the development of hundreds of the nation’s brightest science students. Last year’s event involved 300 students.

- National Science Week exposes thousands of children and young people to the fundamentals of science in a tailored educational program. ANU hosted over 1500 students on campus during Science Week 2003.

- Researchers from the Faculty of Asian Studies have facilitated the Muslim Exchange Project, which increases understanding between young Australian Muslim leaders and their counterparts from Indonesia.

- In the last 12 months, ANU expertise has been called upon to contribute to national exhibitions including *Australian photography: In a new light*, held at the National Library of Australia and materials of national importance from ANU archives were used in the

- The Drill Hall Gallery is an important location for travelling exhibitions as well as exhibiting works from the ANU collection. It is open to the public and the 10-12 exhibition openings each year are attended by up to 200 people.

**The international service of the ANU**

Through teaching, research, technology transfer, diplomacy and hands-on aid, the ANU builds relationships with communities around the world. The University is involved in a diverse range of research, education and outreach programs internationally. ANU research and consultancy work addresses problems across a wide range of areas including HIV/AIDS, water quality, alternative energy technologies, public administration, and law reform.

- The ANU Centre for the Public Awareness of Science (CPAS) is the UNESCO Centre for Scientific Communication and has initiated science communications programs in South Africa, Thailand and the United Kingdom. In 2003 CPAS ran a three-month travelling science road show, providing science education in some of the poorest neighbourhoods in South Africa, training 185 science teachers in 69 schools and seen by 20,000 students.

- The University has established the Australian node of the World Bank Global Development Learning Network (GDLN) on its campus, and in 2003, staff from the ANU Asia Pacific School of Economics and Government used it to train more than 100 senior civil servants in East Timor.

- ANU Enterprise, formerly ANUTECH, the commercial arm of ANU is currently involved in development projects in countries all over the world, including Nepal, East Timor and the Solomon Islands. In January 2003 it completed one of the longest continuous aid programs ever, working in forestry in Nepal.

- In 2002, researchers from the Centre for Cross-Cultural Research initiated appropriate cultural heritage tourism in Malakula, Vanuatu.

- Researchers from the Research School of Pacific and Asian Studies have reviewed and assessed feasible alternative livelihoods for traditional fishers who accessed the Timor Sea.

- In 2002, the Research School of Information Sciences and Engineering collaborated with the Istituto per la Ricerca Scientifica e Tecnologica (IRST), Trento, Italy to solve problems of power supply restoration.

The Asia Pacific College of Diplomacy was established at ANU as a joint initiative between the Australian Government and ANU to educate diplomats from the region. The College is the first of its kind in the Southern Hemisphere. The ANU also hosts the International Centre of Excellence in Asia-Pacific Studies, funded by the Australian Government, and the National Europe Centre, funded by the European Commission.

The E-mental health Centre is a world leader in research on web-based interventions. Its national leadership has been acknowledged by the Commonwealth Dept of Health, which commissioned the Centre to produce a policy report on the area, and by “beyondblue” which has given a large grant to the Centre for a national e-prevention project linking all e-mental health researchers in Australia.
The ANU joined with UNSW and the ACT and NSW Governments in the National ICT Australia (NICTA) consortium that is being provided with Commonwealth money in excess of $130M. NICTA has the aim of becoming an ICT research centre of global significance and is expecting to build a core of 300 world-class researchers and create more than 500 new PhD places in the higher education sector over the next 10 years.

The Australia and New Zealand School of Government (ANZSOG) has been established by a consortium of Australian and New Zealand governments and universities as a world class Australasian school of government.

ANU researchers were awarded a $9 million grant by the US Government in 2002 to help establish the Australian Phenomics Facility on campus, accommodating a unique library of mice to help identify genes that regulate immunity and tolerance of disease.

Many ANU researchers are involved in the work of international bodies, such as the United Nations, the World Bank, the International Monetary Fund, the Asian Development Bank, and the World Health Organisation.
CHAPTER 6: PROGRESS REPORT – 2001 REVIEW OF ADMINISTRATION

The capacity of the ANU to deliver high quality research and education is dependent, to an important degree, on its administrative infrastructure and services. This Quality Review therefore includes an assessment of the degree to which the University’s administration is focused on supporting academic excellence.

The administration portfolio comes under the custodianship of the Executive Director (Administration), who is a member of the University Executive. It covers resource management, student administration, research support, and academic and information services. The administrative framework consists of central units responsible to the various members of the University Executive, and elements situated in all but the smallest academic areas answerable to the Deans or Directors of the areas.

In 2001, a detailed review of the University’s administration was undertaken by Prof Ken McKinnon and Ms Sue Walker. It focused on developing a culture of collaboration between academic and administrative arms of the institution, and the enabling of academic outputs by the administrative systems and processes. The McKinnon Report set out a path of reform adopted by the University.

The assessment carried out for the Quality Review has involved an assessment by McKinnon and Walker of the progress made by the University in pursuit of the agenda established in 2001, and the present stance of the administration in support of academic activity. Self-assessments were compiled by each central administrative division and by each academic administrative unit. McKinnon and Walker considered the contributions and discussed them with stakeholders throughout the University.

A copy of the report, completed in June 2004, is included in this Review.
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<tr>
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<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3</td>
<td>Postgraduate research students</td>
<td>37</td>
</tr>
<tr>
<td>6.4</td>
<td>Induction and training</td>
<td>38</td>
</tr>
<tr>
<td>6.5</td>
<td>Benchmarking</td>
<td>39</td>
</tr>
</tbody>
</table>

**Appendix 1**  
Organisation Chart
Terms of Reference

Examine and report to the Vice Chancellor on:

1) Progress made in implementing the recommendations of the McKinnon Walker Review of Administration, November 2001 within the framework set out in ANU to 2005.

2) The effectiveness of the administration of the ANU in support of academic objectives.

Acknowledgement

The reviewers acknowledge with appreciation the excellent assistance of Ms Leslie McDonald in setting up the arrangements and caring for our comfort during this Progress Review.
Executive Summary

In the two and a half years since the 2001 Review of Administration there has been a sea change in the administration of the ANU. In particular the concept of an ‘enabling culture’ has been widely adopted by staff in the administrative divisions both central and among the Faculties, Centres and Research Schools and in large part in the academic community. Morale has turned for the better and there is a noticeable ‘can do’ attitude replacing the previous sense of inefficiency and drift.

While culture change can only be part complete in the time since the 2001 Review the commitment of staff is energising, and giving impetus and clear direction to the multitude of specific reform processes undertaken within the University.

Developments have been influenced, and for the most part given extra impetus by the leadership of the Vice-Chancellor, Professor Ian Chubb, who has led the redevelopment of the University’s vision and near-term objectives, pointed the way to get the most benefit from government policy developments, gained the full cooperation of staff and led them through the changes proposed in the 2001 Review with vigour and imagination.

A more enabling culture is being realised through greater mutual respect, more positive attitudes, information sharing, cooperation, acceptance of the goal of continuous improvement, better processes and training and learning opportunities. Benchmarking of processes and practices against those in seven other universities has been introduced. New staff with a commitment to this culture have been recruited.

The framework of common University goals and infrastructure, common policies and devolved administrative operations advanced markedly in quality. Autonomous Research Schools, Centres and Faculties evaluated the changes as improving University administrative services. Coordination of central and devolved administrative units is still insufficient to resolve all of the problems of improvement of processes and the resolution of priorities for attention.

The central administrative units showed the benefit of the wide array of initiatives undertaken since the Review. All are working with enthusiasm and application but different degrees of success so far. Quantitative benchmarking, in its early stage as yet, is giving further impetus to improvement.
Chapter 1

Challenge

1.1 The 2001 Review

In our Review of Administration, November 2001, we acknowledged that by any standards ANU was a respected international university. We went on to say that obviously things had changed over the life of the University and that traditions and practices that had been appropriate in more settled times might fall short of meeting present and future needs. We pointed out that achievement and maintenance of pre-eminence is no easy task and that attainment of that goal depended as much or more on regular renewal of the culture of the University as specific reforms.

The overriding theme of that Review was the importance of establishing an enabling culture throughout the University. This theme came out of strong input from within and without, confirmed in a hundred different ways, asserting that the pervasive culture of the University was compliance oriented, overly bureaucratic, very much 'us and them', lacking in mutual cooperation, people working in isolated silos, and prescriptive rather than enabling.

The Review identified an enabling culture as being

the opposite to endless debate and delays; to governance by irrelevant past precedents; to neglect of new needs; to a public service compliance orientation; to 'us and them' attitudes between the centre and devolved units. An enabling culture is characterised by a universal commitment to University goals, by academics and administrative staff working together harmoniously, by a common service orientation, by speedy problem solving, by a will to find new solutions to problems, by initiative taking and more.

The challenge of reduced proportions of government funding, effectively privatisation, would be for all staff to reorient their thinking and attitudes to be complicit, if not personally active in working together, to generate the funds needed to carry out the University’s academic programs, whether by recruiting fee-paying students, securing research grants or engaging in consultancies. They would have to find and use the most efficient and speedy administrative processes and erase, or at least minimise, counter-productive, over-sharp academic-administrative caste distinctions so that facilitation of the academic enterprise continued at all times to be the primary focus of effort.

There was recognition that while there was enthusiasm for change there were some significant impeding traditions and specific problems standing in the way of an enabling culture, which would not be achieved overnight nor without coaching and extensive training opportunities for all staff. One of these, now behind the University, was the Peoplesoft Enterprise Solutions Project software, so different from the administrative systems used in the past as to cause substantial staff distraction and doubts.
The enabling culture theme was translated into ten conclusions (Ten Key Proposals) and recommendations applying to the whole University, the progress of which is assessed in Chapter 3. They were framed within the context of the need for the nurturing of collegiality; decisive, responsible leadership; teamwork that successfully handles ambiguity; and clear distinctions between policy and management.

The Review examined in more detail desirable changes in specific administrative areas, the progress of which is assessed in Chapter 4.

1.2 Reporting of progress

This Progress Report is based on a limited assessment period. The administrative heads of all Faculties, Centres and Research Schools and the Directors of all central administrative units were required to submit a self evaluation of progress against the twin criteria of our 2001 Review (virtually all of the recommendations having been approved) and the ANU planning document ANU to 2005. Each self evaluation was required to include feedback from ‘clients’ and other units.

The reviewers' time on campus was too limited to allow assessments as detailed as in the 2001 Review, but was sufficient to allow meetings with both academic and administrative heads of units, together with meetings with undergraduate and post graduate students representatives and a representative of the National Tertiary Education Union (NTEU).

The reviewers have been more than pleased to have an opportunity for feedback concerning the usefulness and effectiveness of reviews, both in seeing that the 2001 Review had been widely accepted as a fair diagnosis of needs, and in seeing the achievements in the time since then.

As a Progress Report, we have not included any formal recommendations. Sufficient comment has been included in each section to ensure those concerned have guidance for the next phase of improvement.
Chapter 2

University Developments

2.1 Complex changes

It is not possible to distinguish conclusively between developments directly attributable to the 2001 Review, developments resulting from revised government higher education policies, and developments within the ANU community in pursuit of a re-invigorated vision. The net effect is that the last two and a half years has been a period of enormous activity throughout the ANU. The 2001 Review clearly sparked many of the developments, but it is simply impossible to separate that effect from those engendered by the other influences described in this Chapter.

2.2 ANU to 2005

For the triennium 2002-2005 ANU developed a strategic plan ANU to 2005, a plan distinguished by brevity and clarity of goals and tactics. The plan defined the University’s primary mission, through the relentless pursuit of excellence the Australian National University will be one of the world’s top universities, and goals for each of education and research, with nine tactical targets for reaching desired outcomes. The plan, by asserting clear goals, by defining staff and students as the University’s primary consideration, and by asserting such priorities as form being subordinate to function, is giving clear guidance for work on structure and processes. Spontaneous reference to ANU to 2005 by many staff indicates its key influence for decision-making and the unity of purpose that it is engendering.

2.3 Diversity of funding sources

In the last three years ANU reliance on the operating grant from the Department of Education and Science (DEST) has dropped from 51.7 per cent to 41.3 per cent. Annual research income has increased by over $100m from 10.0 per cent to 22.7 per cent of total funding (growth of the latter is partly due to entry to the ARC and NHMRC funding pools). Other significant changes in the proportions and diversity of sources have completely changed the University’s funding picture.

The most important outcome is that the University has to operate more like a private university than a public institution. The University as a whole, that is, all Faculties, Centres and Research Schools, have to raise a significant part of their total income by their own efforts. Units lacking in energy or initiative are likely to wither on the vine. Although the University has so far managed this transition well, acceptance of its inevitability is only partial within the academic community.

The University has successfully responded to the challenges by increasing its overall revenue from $451m in 2001 to approximately $576m in 2003 as shown in Figure 1.
There have also been changes in the method of deployment of the budget within the University, the most obvious of which has been to link increases and even retention of funds to academic performance. Units can rely on an allocation of 97 per cent of the current annual budget allocation for next year, the remainder being dependent upon reaching agreed enrolment and other targets. Similarly, encouragement is given to international student recruitment by allocating the majority of funds earned from their enrolment to those units.

2.4 Government higher education policy

In the last two years the Howard government has engaged in one of those periodic bouts of what governments call ‘reform’ of higher education. The changes have included;

- New restrictive funding arrangements for particular disciplines
- Approval to charge additional HECS fees
- A revised Research Training Scheme for postgraduate students
- Changed Research Funding arrangements
- Revised governance arrangements.

The upshot for 2004 and subsequent years has been increased control (euphemistically called accountability), accompanied by fragmented, increasingly bureaucratised funding
programs, and unlimited intrusions into core academic processes. An instance of the latest is the new information system, Higher Education Information Management System (HEIMS), through which the progress of every student in every university in the country will be traced minutely by federal bureaucrats. In short, ANU has had to divert far too much of the time and energies of staff to responding to controlling mechanisms while at the same time being expected to be entrepreneurially diversifying its funding sources.

2.5 Structure

There have been significant structural changes within the University. In 2001 the formerly separate Faculties Academic Board and the Institute of Advanced Studies Academic Board were merged and restructured. A medical school has been established, and there have been other academic program changes. Two other changes in the academic structure have long-run significance for the administration of the University although they are as yet in the early stages of implementation.

National Institutes  The first, the creation of virtual National Institutes, was intended to signal clearly the breadth and depth of scholarly activity at the ANU without changing existing academic/administrative units. The intention was that an Institute would have as its primary roles the linking of Research Schools, Faculties and Centres in ways that would facilitate coordination of teaching, research and scholarship, and, second, the engagement of national and international audiences, business people and policy makers, with the academic strengths of the ANU.

After a three year trial period Institutes have been deemed to be sufficiently successful to justify renewed funding for ten such Institutes, five in each academic Division. The existence of Institutes is effectively recognition that the unique strengths of ANU’s Research Schools and special research Centres, and its increasingly strong teaching and research Faculties, means that the ANU has overlapping and deep academic strengths that need to be harnessed and projected more widely.

Academic Divisions  In December 2003 the University decided to organise its academic planning into two Academic Divisions of cognate academic groups, one being Science, Engineering and Health and the other Social Sciences and Arts. Each Division is made up of Research Schools, Faculties and Centres. The National Institutes that closely relate to each Division are also included to make up Divisions as shown in Figure 2. Each will have four committees, for Planning, Education, Research, and Information. Divisional committees will take on much of the business previously dealt with by the previous sub-committees of Academic Board.

Deans and Directors and their Prescribed Authorities will acquire greater academic delegations (that is, authority over education and research matters within their local areas).

The Academic Board will retain its existing functions but in addition assume a strategic planning role as the University Planning Committee. What were formerly its sub-committees, Education, Research and Information Strategy, will be renamed as University Policy Committees and have a distinctive policy orientation and revised membership.
The objective of each Divisional Planning Committee will be to achieve the strategic goals of the University through enhancing the academic work of each Division and improving the beneficial application of resources. The functions of the committee are broadly:

- Planning and coordination
- Profiles and performance
- Quality and continuous improvement
- Monitoring and advising on resources

---

**Figure 2 Divisional structure ANU**

<table>
<thead>
<tr>
<th>Science, Engineering and Health</th>
<th>Social Sciences and Arts</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAS</td>
<td>RSPAS</td>
</tr>
<tr>
<td>RSAA</td>
<td>RSSS</td>
</tr>
<tr>
<td>RSBS</td>
<td></td>
</tr>
<tr>
<td>RSC</td>
<td></td>
</tr>
<tr>
<td>RSES</td>
<td></td>
</tr>
<tr>
<td>RSISE</td>
<td></td>
</tr>
<tr>
<td>RSPSE</td>
<td></td>
</tr>
<tr>
<td>JCSMR</td>
<td></td>
</tr>
<tr>
<td>MSI</td>
<td></td>
</tr>
<tr>
<td><strong>Faculties</strong></td>
<td><strong>Arts</strong></td>
</tr>
<tr>
<td>Science</td>
<td>Asian Studies</td>
</tr>
<tr>
<td>Medical School</td>
<td>Economics and Commerce</td>
</tr>
<tr>
<td>FEIT</td>
<td>Law</td>
</tr>
<tr>
<td></td>
<td>NITA</td>
</tr>
<tr>
<td><strong>Centres</strong></td>
<td><strong>APCD</strong></td>
</tr>
<tr>
<td>NCEPH</td>
<td>APSEG</td>
</tr>
<tr>
<td>PHCRI</td>
<td>CAEPR</td>
</tr>
<tr>
<td>CMHR</td>
<td>CCR</td>
</tr>
<tr>
<td></td>
<td>HRC</td>
</tr>
<tr>
<td></td>
<td>NGSM</td>
</tr>
<tr>
<td><strong>National Institutes</strong></td>
<td><strong>ANUIIA</strong></td>
</tr>
<tr>
<td>NIB</td>
<td>NIAP</td>
</tr>
<tr>
<td>NIE</td>
<td>NIAP</td>
</tr>
<tr>
<td>NIEIS</td>
<td>NIH</td>
</tr>
<tr>
<td>NIHHS</td>
<td>NISSL</td>
</tr>
<tr>
<td>NIPS</td>
<td>NITA</td>
</tr>
</tbody>
</table>

*Source: ANU Council decision of 12.12.03*
• Policy/planning input.

The related changes for each Education, Research and Information Committee principally concern objectives and membership. As a consequence, reviews and amendment of Statutes, Rules and Orders to reflect the revised composition of the Academic Board and its sub-committees and the function and responsibilities of the various committees and their chairs are in process. The University’s delegations are being amended to reflect where certain authorities will be exercised. A number of policies, procedures and guidelines (in particular those relating to course and program administration, and academic promotions) are to be updated consistent with the new Divisional structure and delegations.

The University foresees the changes will bring better coordination of its multiple and overlapping academic riches and better machinery for consideration of new academic challenges.

The structural changes recapitulated in this section, though not reforming present administrative units or budgets, may for a time take both academic and general staff out of their comfort zones. Frequent effective communication to allay doubts and misunderstandings will be necessary for some time to come.

2.6 Growth

The 2001 Review identified undergraduate under-enrolment as a problem. The University was 4.9 per cent under-enrolled against the 2001 DEST target. By 2003 it was 4.6 per cent over-enrolled. More significantly, there have been increases of the order of thirty five per cent in both coursework and research postgraduate enrolments, as set out in Tables 1-3.
Tables 1-3  Research and Education Growth ANU 2000 – 2004

<table>
<thead>
<tr>
<th>Program Career</th>
<th>Domestic/International</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004 (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Degree Research Domestic</td>
<td></td>
<td>881</td>
<td>864</td>
<td>873</td>
<td>972</td>
<td>1089</td>
</tr>
<tr>
<td>Higher Degree Research Domestic</td>
<td></td>
<td>273</td>
<td>279</td>
<td>312</td>
<td>375</td>
<td>431</td>
</tr>
<tr>
<td>Higher Degree Research Total</td>
<td></td>
<td>1154</td>
<td>1142</td>
<td>1184</td>
<td>1347</td>
<td>1519</td>
</tr>
<tr>
<td>Postgraduate Coursework Domestic</td>
<td></td>
<td>596</td>
<td>584</td>
<td>644</td>
<td>838</td>
<td>847</td>
</tr>
<tr>
<td>Postgraduate Coursework Domestic</td>
<td></td>
<td>465</td>
<td>518</td>
<td>462</td>
<td>600</td>
<td>685</td>
</tr>
<tr>
<td>Postgraduate Coursework Total</td>
<td></td>
<td>1062</td>
<td>1102</td>
<td>1106</td>
<td>1438</td>
<td>1532</td>
</tr>
<tr>
<td>Undergraduate Domestic</td>
<td></td>
<td>5557</td>
<td>5557</td>
<td>6096</td>
<td>6223</td>
<td>6300</td>
</tr>
<tr>
<td>Undergraduate Domestic</td>
<td></td>
<td>357</td>
<td>508</td>
<td>715</td>
<td>1018</td>
<td>1200</td>
</tr>
<tr>
<td>Undergraduate Total</td>
<td></td>
<td>5914</td>
<td>6066</td>
<td>6811</td>
<td>7241</td>
<td>7500</td>
</tr>
<tr>
<td>Non-award Domestic</td>
<td></td>
<td>16</td>
<td>22</td>
<td>21</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Non-award Domestic</td>
<td></td>
<td>59</td>
<td>93</td>
<td>94</td>
<td>103</td>
<td>122</td>
</tr>
<tr>
<td>Non-award Total</td>
<td></td>
<td>76</td>
<td>115</td>
<td>115</td>
<td>127</td>
<td>147</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>8205</td>
<td>8425</td>
<td>9216</td>
<td>10152</td>
<td>10698</td>
</tr>
</tbody>
</table>

(a)  2004 data are as at 24 May 2004 and are likely to increase to full-year. They include 80 EFTSU of Medical School load.

Table 2: Median UAI Score, 2000 to 2004 (excluding UAI greater than 100 *)

<table>
<thead>
<tr>
<th>Institution</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian National University</td>
<td>89.60</td>
<td>89.05</td>
<td>86.74</td>
<td>88.85</td>
<td>90.40</td>
</tr>
</tbody>
</table>

* UAI greater than 100 represent a forced offer rank (that is, a value artificially set high so that an offer is likely to be made).

Table 3: Undergraduate Operating Grant Load Against DEST Targets, 2000 to 2004

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004 (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Load</td>
<td>5557</td>
<td>5557</td>
<td>6086</td>
<td>6213</td>
<td>6300</td>
</tr>
<tr>
<td>DEST Target</td>
<td>5845</td>
<td>5865</td>
<td>5880</td>
<td>5940</td>
<td>6030</td>
</tr>
<tr>
<td>Over(under)-enrolment</td>
<td>-4.9%</td>
<td>-5.2%</td>
<td>3.5%</td>
<td>4.6%</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

(a)  2004 information is as at 24 May 2004 and are likely to increase to full-year. It includes 80 EFTSU of Medical School load.

Source: ANU Context statement for the 2004 Review

2.7  Quality audit

During 2004 the University is undertaking perhaps the most ambitious audit of its international academic standing, discipline by discipline, ever undertaken by an Australian university, and rare on the world stage. It is essentially about research outcomes but involves every academic unit collecting and ordering the published papers and books of its staff and providing its own evaluation of the international standing of its teaching, research and scholarship. Three hundred and fifty auditors from universities...
around the world, acknowledged leaders in the relevant disciplines, are providing external evaluations of the standing of that work, assessing the proportion rating in the top twenty per cent and the top five per cent of papers published internationally. A team of outstanding international academics is then (July 2004) to evaluate the evaluations and summarise its view of the academic output and world-standing of the ANU.

The importance for this Progress Report, which will form a part of the grist for the overall assessment team, is that the work undertaken for the Quality Audit is another massive and demanding task, additional to all of the other developments and changes in progress, and inevitably involving key academic support staff.

2.8 Staff renewal

While the Australian Universities Benchmarking Program (2001-2003) reports ANU's total staff turnover as 13.96 per cent compared to the national average of 16.15 per cent, and that staff turnover is not markedly different from the national average for each subset of Levels A-E of academic staff and the two groups of general staff, HEW 1-5 and 6-10, there is one difference of consequence, that is, a turnover rate for senior staff of 14.6 per cent compared to the average of 10.0 per cent, the result of a considered policy of renewal.

There has been a heavy turnover of senior staff and/or many fresh appointments. The relevant changes are shown in Table 4;

<table>
<thead>
<tr>
<th>Category</th>
<th>Changes</th>
<th>No of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive staff</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Faculty Deans</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Heads of Research Schools</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Centres</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Administrative Divisions</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Policy and planning staff</td>
<td>4</td>
<td>New</td>
</tr>
</tbody>
</table>

Source: ANU Context Statement of the 2004 Administrative Review

2.9 Enterprise bargain

A very good pointer to the improved cooperative working relationships within the ANU occurred with the early agreement among the parties to a new Enterprise Bargain Agreement late in 2003.

2.10 Leadership of Vice-Chancellor

Last and possibly of most importance is the fact that achievement of the improvements recommended in the 2001 Review and successful responses to the challenges of the external environment have both depended upon the vigour, persistence and wisdom of
the Vice-Chancellor. It is impossible to overstate the necessity for and the benefits of far-sighted, decisive and experienced leadership for a university in the midst of change.

Since taking up the post of Vice-Chancellor three and a half years ago Professor Chubb has had a remarkable impact. The reviewers know of no other university where there is such outspoken, campus-wide support for the Vice-Chancellor.

At the time of the 2001 Review the reviewers would have said that that outcome would not be possible in such a complex university as ANU, certainly not during a period of such wide-ranging and rapid changes. By common consent, however, the University has the right person, in the right place at the right time.
Chapter 3

Appraisal

3.1 Overview

The University overall is well ahead of the reviewers’ expectations for the pace of realisation of the Ten Key Proposals of the 2001 Review. We did not, of course, expect that the changes would be complete or that there would be perfection, which in any case is not possible as there will always be scope for continuous, improvement.

Our overall judgement is that the University

- has achieved a remarkable cultural transition to date;
- has exceeded the expectations of progress in specific areas, such that most of its administrative services are now at or above average among peer universities;
- is about two thirds of the way to achievement of an enabling culture characterised by a positive ethos and cooperative attitudes and by efficient, enterprising administrative processes;
- could, and should, aim to become within three years a reference site for excellence in administrative processes among Australian universities.

Further comment on the 2001 Review ten key proposals, amplifying that summary judgement follows. Desirable aspirations for further improvement are contained in the references to specific administrative units in Chapter 4 and in the concluding general comments in Chapter 6.

3.2 The Ten Key Proposals

1 A primary University goal should be an enabling service-oriented culture.

The formal submissions from all of the academic and administrative units indicate an enthusiastic, one hundred per cent take-up of the desirability of an enabling culture within the University. Good evidence of energetic action towards realisation of that culture came from all units.

Further probing indicates, however, that some of the longest serving staff do not relish change of this kind so late in their careers. As such staff are often influential there is still the risk of regression. Advocacy of an enabling culture and reminders of the benefits that flow from achievement of that goal must be continuously emphasised.

2 Administrative decisions and processes must be supportive of well-defined academic priorities.
Administrative decisions and processes are now being explicitly designed to support the academic goals outlined in the strategic plan *ANU to 2005*. A continuing weakness, amplified in other parts of this Progress Report, is the absence of effective machinery for coordinating and solving problems caused either by competing administrative priorities or competing academic/administrative values.

As indicated in Chapter 2, the newness of academic developments such as *National Institutes* and the *Academic Divisions*, designed to be optimal for the planning and development of academic priorities, means that their administrative implications are not yet fully evident to all staff. There has not yet been time for them to settle down and for their functions and *modus operandi* to be fully understood.

3 **Lines of responsibility should be better defined, especially at senior levels.**

The reviewers believe there has been some progress but not as much as desired. Although the portfolios of senior staff are now well-defined, there are still gaps in the execution. Where cooperation between academic and administrative staff cannot be optimised at the unit level, there are still instances of stalemate, as a consequence of failure to resolve these matters between portfolios. Executive staff should devise ways of resolving this category of problems.

4 **The University should use student perceptions of administrative systems as one of its key indicators of administrative performance.**

Student perceptions of University services have improved markedly. There is excellent communication between Chancery staff and representatives of both undergraduate and postgraduate students, for which they are appreciative. Nevertheless, students still report impediments such as unnecessary queuing for enrolment and instances of less than efficient postgraduate supervisors.

There are still examples, especially in the Faculties, of academic staff claiming academic freedom as the excuse for not actively cooperating in making improvements designed to increase student convenience. Simple examples such as not allowing students to sign up for tutorials electronically (occasional), or reluctance to schedule lectures in ways that reflect convenience (e.g., time of the day, repeat lectures, availability of Web CT or aural recordings) for the eighty per cent of ANU students in paid work for at least eighteen hours per week, still crop up more often than is necessary.

5 **A revised balance between devolution and centralisation should be implemented.**

Devolution of financial responsibility should not require academic units to handle their own administration. Small devolved units unable/unwilling to service their administrative responsibilities should be able to use a central administrative services unit.
Since 2001 there has been extensive re-balancing of central and devolution responsibilities as a result of sensible cooperation and negotiation between the parties. The efforts of central Divisions such as Finance and Business Services, the Research Office, Human Resources and others to hold forums, give specific advice, provide training and develop service attitudes have markedly raised the level of satisfaction among units. Central-devolved unit cooperation has markedly changed for the better.

6 \textit{Changes to academic and administrative systems and procedures to make them user-friendly should have high priority throughout the University.}

Faculty Deans and Student and Academic Services have worked hard and cooperatively, with good leadership by the Deputy Vice-Chancellor, Deans and the Director of SAS. Regular meetings of consultative committees and Business Solutions groups to overhaul the basic systems that will make the University more user-friendly have been established. There is nevertheless some way to go in this area of the University activity.

7 \textit{The University should establish permanent capacity to revise statutes, delegations, rules, policies and other instruments of governance on a regular basis.}

The University has completely revised its delegations. As a consequence of its re-structuring and a new governing Act that comes into force on 1 July, 2004 it will need also to revise at least some of its Statutes, Rules and Orders (which now have also to be registered on a public government data-base). Revision of the policy framework has advanced a fair distance but there is a way to go.

The reviewers are not convinced that the work so far has had the effect of creating a framework of a relatively small body of mandatory University policies requiring University-wide compliance, with additional advisory policies drafted for the general guidance of staff. More work and better communication are definitely needed, as may be category distinctions.

8 \textit{Representatives of central and devolved budget units should meet regularly for problem-solving and policy consultation.}

Regular meetings and forums have been instituted by all units. This is an excellent feature of reformed activity in the last three years. Two-way information flows have not only increased cooperation and mutual regard, but also have led to better administrative decisions. There is an expressed desire for some types of meetings to occur more often on specific finance, human resources or other topics required by a sub-group of administrators (or academics), even if the information is available in written form on the Web.

9 \textit{The University should have a strong commitment to continuous improvement principles.}

There is remarkably good evidence of commitment to continuous improvement principles. Every unit provided evidence, directly or indirectly, of progression of
their activities from the initiation of obvious improvements to further improvement as the effect of earlier improvements and new needs become clear.

Whether that commitment to continuous improvement has been internalised so that it becomes a way of life cannot be assessed at this time; a further assessment will be needed in the future.

10 Administrative targets and achievements should be both quantitatively and qualitatively benchmarked.

Several of the core units have progressed to quantitative benchmarks. Facilities and Services uses an annual Australia-wide benchmarking manual of long standing. Human Resources is beginning to use a Group of 8 benchmarking manual. Finance and Business Services has begun to quantitatively benchmark. Marketing and Communications traces the effectiveness of advertising by advertising-industry standard benchmarks. Information Services uses international benchmarks to check progress. The Research Office compares ANU with other peer universities (Group of 8). In short, the attitude to quantitative benchmarking is now positive.

There is more to do, both to define what quantitative outcomes the ANU thinks important, and why, and to find or construct appropriately relevant, powerful (quantitative and qualitative) measures of progress.
Chapter 4

Divisional Appraisals

The reviews of the administrative divisions that follow are in no particular order. As will become clear in the reading, every unit has done a great deal of work and there is impressive momentum, but the newness of some key staff would have made quantitative assessments premature. Most divisions are now as good as in peer universities, a couple are outstanding and a couple have a way to go. Overall the administrative services rate as above average, with the distinct prospect of becoming exemplary within three to five years.

4.1 Finance and Business Services

The 2001 Review reported that the finances of the ANU at the macro level had been handled in an exemplary manner and that there was an excellent level of reporting to government authorities. It also said that the Finance and Business Services Division ...cannot hope to be loved by all or in all respects because ...it has to say ‘no’ too often and it has to insist on financial compliance by due dates, but, notwithstanding, ...members of the University see it as doing a reasonably good job.

It went on to say that there was at that point insufficient orientation to the accounting needs of autonomous units, and undesirable and widespread shadow budgeting and accounting. There was need for a revised, simplified Chart of Accounts, patches on the ESP system to facilitate fine-grained accounting for autonomous academic units, help for units in meeting commercial accounting needs, and cash accounting services intelligible to non-accountants available for those who need them. Other proposals were for a stronger cost-accounting program and the overcoming of inconsistent and non-transparent ways of operating.

It is evident that F&BS has energetically endeavoured to be responsive and customer-service oriented. It has established regular forums of different types and frequencies to meet demand. It has redeveloped financial systems and business practices. It has extended its visitation program and provided tailored advice on demand. It has gone out of its way to build an enabling culture and to facilitate best practice.

It has also responded to the specific proposals to revise the Chart of Accounts, to improve budgeting and forecasting capacity and to produce accounts/reports that meet the needs of internal budget units. It has used external advice to simplify and improve accounting systems.

Its self-evaluation said that it had had only a small number of comments on ways to improve service delivery, which will be implemented subject to resource availability. It benchmarks performance against best practice accounting standards, eg, for purchase cards, accounts payable and budget monitoring and reporting.
Written input and discussions with all of the budget units within the University elicited nothing but praise for the way that F&BS has operated over the last two years. Best of all, the hassle previously evident with the ESP Peoplesoft system has almost completely gone; only one person mentioned problems this time.

F&BS has clearly had a strong commitment to its goal of an enabling culture, legislative compliance, maximising best practice and responsiveness to emerging issues. Peter Shipp and Maxine Donaro came in for particularly favourable mention among client units.

The reviewers note that being on the receiving end of unanimous praise is an enormous achievement. Our main observations lie in the area of encouraging continuance of the efforts, especially in three areas;

1. Cost accounting is still an underdone area.
2. The move to strategic financial planning both for the University as a whole or for major units has some way to go. It will be quite a while before everybody is competent with that type of financial planning and monitoring. In any case it is a constant task because there will always be new staff requiring help.
3. The additional ESP financial unit coming on stream soon will make fine-grained and alternative accounting presentations more possible for those units having to comply with the requirements of diverse grants bodies.
4. F&BS cannot rest until all shadow accounting disappears voluntarily on the grounds of lack of necessity.

Overall the F&BS has much to be proud of. It has made great progress and now provides a first-rate service.

### 4.2 Human Resources

In the 2001 previous report, the Human Resources Division came in for more criticism than any other. To some extent this is understandable given that matters relating to employment conditions are dear to the hearts of every individual in the University community. While it was apparent that the staff worked very hard and were helpful on an individual basis, there was a general view that the Division did not respond either quickly or sensibly to matters of concern.

As a consequence of such criticism, staff morale within Human Resources was low and people felt that they were constantly running to stand still. The limited time available to us for this review meant that the reviewers did not meet with staff of the Division other than the Director and Deputy Director so were not able to test definitively whether staff morale had improved.

In response to the 2001 Review the Human Resources Division identified nine attributes of an enabling culture to guide its activities. These were:

- a strong central policy framework that is revised regularly to keep policies current;
- a balance of devolved and central administration with close working relations and helpful guidance to devolved units;
simplification of, particularly, academic administration processes and provision of
speedy and accurate responses;
- a commitment to high quality service and to continuous improvement and client
feedback;
- clear performance expectations with well defined lines of authority;
- staff development, training and coaching to support needs related to University
goals;
- a commitment from all supervisors to good people management, teamwork and
staff development;
- decision making located as close to the workplace as possible;
- academic, administrative and executive staff working together to solve problems
and to develop policies.

The reviewers were provided with a self assessment of progress by the Division against
these attributes. There have been significant achievements in all areas. They include
improvements to the HR web site following user consultation; the rewriting of policies
concerned with the 2003–2006 Enterprise Bargain Agreement; simplification of some
awards; improvements in recruitment and staff management processes; regular
meetings and forums with key stakeholders; improved salary sacrificing arrangements;
work in progress on developing an HR Help Desk; establishment of a team approach to
reflect upon the needs for support of the University’s cognate divisional structure;
induction, training and career development initiatives for Deans, Directors, Heads and
supervisors; development of a universal career development program for all staff; and a
number of other pleasing initiatives.

There is no doubt at all that the staff in the HR Division, new and old, have worked
extremely hard to improve processes and develop better human resources services to
enhance the ANU as an organisation, both within the Division and with their client
groups.

In addition to the day-to-day matters, the Division is planning strategically, probably for
the first time in its history. The key tactical human resources goal in ANU to 2005 is to
strive to achieve the best possible working environment for all its staff and students and
work to ensure a supportive, safe and fair workplace for all.

The Director of HR has succeeded generally in building good personal relationships
within Faculties and Schools by being hands-on in his approach. He does, however,
need to do a fair bit more to publicise the good things that have been achieved, including
promoting his vision of HR’s ability to support the current and future directions of the
University.

Despite all of those positives, HR does not escape criticism. In the meeting held with
Deans, for example, the Dean of Medicine was particularly outspoken in his views about
difficulties he had had with the HR Division (and every other area of administration). His
views were not generally echoed by others who felt there had been a marked change in
culture and efforts to be more accommodating and understanding of the academic
enterprise. But other criticisms were raised in different forums and in written
submissions to the Review.
A major problem raised by many continues to be delays in responses to inquiries. Frustration at apparent inability to contact a real person is exacerbated by instances of emails being ignored and voice messages going unanswered. There were too many reported instances of information supplied being contradicted by another team member at a different time. There are, of course, two sides to the latter problem. What might at first seem to be straightforward query, in the context of further information may require a different answer. Nevertheless, it is absolutely essential that information given can be relied upon to be accurate. Further training of HR staff to ensure capacity to uncover and answer the real questions promptly must be undertaken.

Although great strides have been made in devolving appropriate HR powers to Faculties, Schools and Centres, lack of clarity about exactly who is responsible for what still bothers units.

There is slippage between the intention of HR to provide a clear policy framework and its implementation. One example concerned promotions procedures. These were mentioned as being particularly fraught, especially the selection, composition and responsibilities of promotions committees. In addition, although the Director of HR assured us that the use of forms designed by HR to obtain written references was optional, some areas were under the impression that it was a requirement and had been on the receiving end of irritated responses from referees who objected to their use. Having seen the forms we were not surprised.

These sorts of problems need to be sorted out by continuing training and dialogue between HR and the non-central administration units to ensure that nothing falls between the cracks.

Similarly, insufficient induction training is available for new people in non-central administration units, especially where the total number of people is very small and corporate knowledge cannot be relied upon. The reviewers were impressed by the written guidance available and the availability of regular forums for new staff and supervisors of new staff. One very new Business Manager, nevertheless, did not know how or who to ask about a system required for her unit in order to avoid reinventing the wheel. This kind of issue needs attention if the University is to work at optimal efficiency. It is possible that the Help Desk will take care of such problems but, since it will not be fully operational until 2005 there is a need to fill the gap in the meantime.

A Balanced Scorecard assessment would give the Human Resources Division a great deal of credit for extremely hard work in improving policies, resolving large scale problems and designing frameworks for realisation of the tactical objectives set out above, while qualifying that assessment for inability to get on top of the responsive customer-service issues discussed in this part of the review. There are a fair number of ready critics (and whingers) in any university; the challenge of Human Resources is to teach, service, or charm them into overcoming their problems.

4.3 Research Office
In 2001 the reviewers found that the Research Office was the butt of many complaints about it being a bottleneck, holding up grant applications for too long and generally being seen as an obstructive policing, rather than warmly appreciated service unit.

The Research Office (RO) has definitely moved in a commendable way to service better the research grants, information and ethics functions.

While retaining the final responsibility for ensuring that all grant applications are of high quality, administratively consistent and clearly branded as coming from the ANU, the RO, via its Linked Model, has devolved responsibility for finalising grant applications to Research Schools, Centres and Faculties that have appropriately trained staff. It has also delegated to Deans and Directors authority to sign off on agreements and contracts up to $50,000 in value, a figure that may be raised in the near future.

In the self-evaluation and client satisfaction surveys, the input notes specifically improvement in the accessibility of RO staff, the much greater contact between units and RO staff, and the service attitudes of RO staff. Comments such as…things have been getting better every year were common. The experience of devolved units with the Linked Model has been positive (the RO’s model of devolution was considered by some units to be better than they experienced with other Divisions).

Clients have appreciated the better communication through the Research and Post Graduate Activity Spread Sheet and the web-based query interface (Valhalla). There is now a strong emphasis on recruiting and training staff with a demonstrated commitment to client service and appropriate job-related knowledge. The Business Solutions group mapping improvements to the research software is also becoming increasingly effective.

Some researchers unfortunately feel that …the rate of change is so fast that academics are starting to ignore the changes because they cannot keep up with them and that there was insufficient defined implementation and compliance processes. Unfortunately, because failure to keep up may mean obsolescence for those people beyond the control of the RO.

One unit’s comment that …we still need to find a way to make better use of these (Innovation Access and various other ventures with commercial or foreign ventures) opportunities suggests that the boundary between the RO and ANU Innovation, i.e., the boundary between research management and the commercialisation or exploitation of research needs to be clarified and better communicated.

The reviewers were struck by the vastly increased appreciation of the Research Office’s services and skilled advice within the research community. This improvement has been achieved despite the increased overall workload of research grant applications and management as a consequence both of the participation of the ANU in the ARC and NHMRC grant schemes and of the outstanding success rate ANU researchers enjoy.

What all of the above add up to is a remarkable improvement in the functioning of the Research Office, exemplified in particular by the increased confidence and outgoingness of the Director, Dr Ian McMahon.
4.4 Quality Enhancement and Statistical Services (QESS)

QESS did not exist in its present form at the time of the 2001 Review. It was then the Planning and Quality Assurance Unit with a primary responsibility for planning and statistical services and a recently acquired and not well developed or clear role in quality assurance.

The reviewers were not complimentary about the unit noting that ...it had struggled to have any impact on the planning function. Its analyses, by and large, have not influenced the University directions in the manner intended. It has not been as valuable a resource as it believes it should have been. We proposed that the key role of the unit should be statistical reporting and acting as the secretariat for the quality assurance initiatives undertaken by the University. After reporting that the Quality Assurance function lacked fire-power, we noted that the University would have to establish some new processes to handle quality assurance.

In January 2004 the University reformed and renamed the unit. As part of the reform it clarified the statistical role and beefed-up the quality enhancement role, incorporating within it CEDAM, the Equity and Diversity Unit, the Academic Skills and Learning Centre and the Australian National Internship Program. The two sub-units are reviewed separately in the following paragraphs.

Statistical Services A new leader for the Statistical Services sub-unit was appointed in 2003. The self-evaluation indicates that he has led the ...application of technological and communications solutions designed to improve the quality, timeliness and relevance of the services (developed by Corporate Information Services). A dynamic tabulation technology known as Pivot Tables has been implemented to improve the speed and quality of ad hoc reporting.

The feedback on Statistical Services included ...unanimous praise and gratitude for the services offered by the Statistical Unit and this was contrasted with the often highly erratic, untimely or individual dependent services offered in the past. There was a raft of other praise; ...fantastic service for a recent School review, ...staff are obliging and unfailingly courteous, and, ...gone are the days of cover-ups of information.

That is not to say that there is no future agenda. The unit needs to keep up its efforts to ensure communication with all University academic units. In truth this is a bag of needs encompassing training and continuing education in the need for, and the skill levels required for, exemplary statistical services in a highly devolved University. There are new needs associated with on-line enrolment, revenue and similar processing. For instance, the old garbage in, garbage out syndrome must be avoided for devolved operation of the Student 21 system if University enrolment statistics are to be reliable.

The reviewers did not have time to investigate statistical services in detail. We were sufficiently impressed by the huge change from universal criticism of the past, by the evident University-wide confidence in the reliability, comprehensiveness and quality of the service, and the unusual situation of a Vice-Chancellor and Deputy Vice-Chancellors no longer feeling themselves to be in the quicksand of unreliable bases for internal planning and for reporting to outside authorities. Praise was almost universal.
Quality Enhancement Immediately it was formed the Quality Enhancement Unit senior staff became part of the University-wide Quality Review, with a special responsibility for the Education and Community Outreach aspects. Consequently it is not yet clear how or when the incorporation of CEDAM, the academic skills and the internship units will offer benefits for the University.

The Equity and Diversity Unit self evaluation pointed out the multiple ways that it is assisting in promoting an enabling culture, particularly in fostering attitudes helpful to gender balance, career development, prevention of discrimination and harassment and other such matters, while aware that there is still a considerable legacy in the ANU of patriarchal, age and class attitudes.

The main matter to note is the need for a clear post-Quality Audit brief for the Quality Enhancement Unit. It is likely that the Quality Audit, in evaluating the teaching function, will be limited to the production of indirect data such as enrolments, progress ratios, graduation rates and CEQ ratings. ANU does not have any better benchmarks of real undergraduate achievement or teaching quality levels than any other university. It is limited to surrogate pointers.

Yet students still remark on the fact that not all staff have intelligible levels of English in the lecture situation and that common University-wide levels of student-oriented services, such as clear statements of course contents, assessment requirements, tutorials and teaching staff for all courses are still not universal. They are also convinced that the University is unaware of or not responsive to the need to schedule courses to fit in with the eighty percent who work at least part time.

So the challenge is to get a proper handle on how the combined resources of the unit can be harnessed in ways that encourage teaching improvements (especially among those who most need help but may not seek it) and coaching for those, whether students or staff, who need it.

4.5 Student and Academic Services (SAS)

The Student and Academic Services Division was an area targeted for improvement in the 2001 Review. Suggestions for turning more explicitly and determinedly towards better student services were put forward as exemplars of the needs. A shorthand description would have been that the University was organised for staff convenience or worse, simply carrying on with old unexamined ways that had no value. And, second, there were insufficient mechanisms for tackling the problems.

There have been two major mechanisms for change. One was the review of undergraduate education chaired by the Deputy Vice-Chancellor, Education, which reviewed both academic and administrative practices and brought about significant improvements.

A second major force for change has been the completion and implementation of the Student 21 module in the Enterprise Solutions Project. As with projects of this kind, specification of the needs involved reviewing existing processes to see whether there was a better way. Many simplifications and features more attuned to student needs
came out of the Business Solutions Group review of existing practices and systems, comprising representatives of Faculties, students, SAS and technical staff. Regular meetings of a more broadly based consultative group have contributed to better communication and mutual learning that is leading to continuous improvement.

Student 21 is an effective system for those who use it regularly, although not wholly intuitive and user-friendly. The next upgrade due at the end of 2004 will make it web-based and more accessible with less need for specialised training of users.

The self-evaluation pointed to commitment to an enabling culture, improved academic and administrative processes, staff development and customer service training, and continuous improvement strategies. Input from user groups agreed ... there had been a sustained improvement in SAS services over the term of the present Director, including the customer-service focus of SAS. The new group, medical students ... expressed satisfaction with their enrolment experience, particularly the presences of student helpers. A staff comment was...there are always solutions and we receive the best attention and assistance.

The reviewers believe there has indeed been a full commitment to an enabling culture and to continuous improvement. Commitment to training staff devoted to student and academic services in the devolved units has also been consistent. The overall situation is substantially better but the problems are not all gone. Two areas must be singled out for comment, academic/administrative cooperation and the Research and Scholarships Office.

Academic/administrative cooperation That academic/administrative cooperation is a hoary old chestnut for discussion in many universities does not mean that it is irrelevant for the ANU. The bone of contention as usual is the question of who adjusts to whom and in what timeframe? The SAS staff themselves noted that ... outcomes and efficiency would be improved if stronger academic/administrative cooperation occurred in the form of earlier involvement in the decision making stage rather than last minute advice of already agreed policy change which required administrative support or implementation.

The bigger question is whether the University has a priority for student orientation that ought to be the reference point outweighing reluctance to change on the part of either the academic staff or the administrative staff or both. Some changes that would improve the convenience of students, such as further curtailment of unnecessary prerequisites for individual courses, or universal electronic sign-up facilities for tutorials, have not been made because one or other has resisted and the politeness of universities has meant that in the absence of consensus the issue will not be forced. Some of the 2001 Review example list of ten problems peculiar to the student administration area remains unsolved.

Research and Scholarships Office Staff of the RSO are spoken well of by their counterparts in academic and research units. They are evidently experienced, warm, friendly and keen to help. But still, the University did not succeed in utilising its full quota of scholarships in 2004 (20 were not allocated). The solution of adding to the staff which was suggested by many sympathetic staff members in Research Schools and Centres might have been more convincing had it not been for the information that would-be
postgraduate students have their application file circulated by hand around the several units for up to six weeks, during which student stipends are not paid until a home is found for the student. Why this could not be done electronically or some less heavily committed staff from elsewhere temporarily re-deployed was never explained. In short, there is a fair way to go with the RSO.

Overall the reviewers can see there has been good improvement in the functioning of the whole of SAS, including full commitment to an enabling culture. That said, the service level is neither higher than in comparable universities nor sufficient yet to meet the goal of a student-oriented University.

4.6 Student Recruitment and International Education (SRIE)

The Student Recruitment and International Division (SRIE) has exceeded its core goals of meeting domestic and international student recruitment targets. At the time of the 2001 Review it was hoping to overcome the then shortfall of undergraduate students against the DEST quotas (the shortfall cost the University money in withdrawn grants), and to reach 2000 international students by 2005, a target that it has easily exceeded by reaching 2955 in the current year (21 per cent of total load). There has also been improvement in the minimum and average UAC admission scores. SRIE regards itself as a … coordinator and primary motivator as well as generic promoter of the University’s programs at home and abroad rather than the sole recruiter.

Its self-review is frank and tough-minded. It rates itself

- National Recruitment Exceeded targets 5/5
- International recruitment Exceeded targets 4/5
- Outcomes focus Very Good 4/5
- Support internationalisation Sound 3.5/5
- Support student success Very Good 4.5/5
- Working environment for SRIE Staff Very Good 4.5/5
- Achieve highest standards of excellence Satisfactory 3.5/5

It saw itself as needing to supply better data to the University, use a broader network, make better use of the web, increase face-to-face contact with prospective students, improve internal communication, secure more exchanges/study abroad students, provide more mentoring and career guidance to staff, and to ensure care when undergraduate admissions staff transfer to SAS as is proposed.

The Division rates itself overall as four on a five point scale, in so doing draws attention to recruitment maintenance including attracting the best students, to diversification of sources issues, the need to review policy and strategic considerations and to the challenges of the student experience. The only external assessment came from one of the Division’s chief clients, the Faculty of Economics and Commerce, which pointed to delays in undergraduate recruitment turnaround times, to the need to improve the quality of postgraduate course-work marketing and to the scope for more marketing to on-shore students already enrolled in schools and colleges.
The reviewers earlier reported that a more cohesive marketing program was needed as money was being wasted in uncoordinated programs, that international recruitment processes were so slow and grudging that agencies and embassies were directing their students elsewhere and, above all, there was not yet the degree of drive and cohesion that the University needed.

With the exception of slow processes the problems have been overcome. The reviewers were impressed with the results-oriented and caring attitudes exhibited in both operational planning and in the refreshingly frank self-evaluation. The turnaround issue is another example of less than optimal student processes. Why the University is still locked into the need to return all applications to the University and thence to the Faculty before approvals can be given is beyond belief. Certainly some applications that do not fit the core template for that country may need to be checked in Canberra, but that should be the exception rather than the rule. Rather than the Faculty blaming the problem on SRIE, the two units should get together and solve the problem.

An area not represented in the planning is internationalisation of the outlook of domestic undergraduate and postgraduate students. Expectations of international outlook and understanding as an outcome of undergraduate studies may be more of an academic than an administrative matter but should be represented somewhere, possibly in this administrative support unit.

Overall, the reviewers are impressed by the achievements of SRIE in the last two and a half years. Their results must have transformed the financial possibilities and outlook for many academic units.

### 4.7 Division of Information

In 2001 the Division of Information was organised into four service units, scholarly information (with libraries at the core), information infrastructure, corporate information, and scholarly technology, with a view to exploiting to the full the information technologies and resources rapidly becoming available. The review noted the range of developments then being planned and their importance to the University. At that time we had some concerns about staff and student access. The importance of the Corporate Information Services in the implementation of the PeopleSoft Enterprise Solutions Project was underlined and there was questioning about the rate of progress with electronic records and archives.

The Division's input canvasses the degree to which the infrastructure and services of the University are enabling and responsive to students, adapted to research and educational agendas, and congruent with ANU's longer term objectives. It has converted the primary objective of Tactical Goal 5 of the document *ANU to 2005*, which is *to create world-class information environments for research, teaching, learning and administration*, into 13 annually reviewed programs, the performance and quality issues being integral to those reviews. The thirteen programs through which services are delivered comprise:

- Enterprise solutions
- Web solutions
- University records
- Teaching and Learning
These have been categorised within the four main functional areas as shown below.

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<th>Researching</th>
<th>Teaching</th>
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<tr>
<td>Collaboration</td>
<td>Teaching Management platforms</td>
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<tr>
<td>Scholarly communications (incl Collections)</td>
<td>Scholarly publications (access)</td>
</tr>
<tr>
<td>E-Research (incl comp models visualisation, data management) (laboratories)</td>
<td>Course material (prep. delivery, repository)</td>
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<tr>
<td>Tele-instrumentation</td>
<td>Digital experiments</td>
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<tr>
<td>Publishing</td>
<td>Flexible education environments</td>
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<td>Staff development programs</td>
<td>Staff development programs</td>
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<th>Learning</th>
<th>Administration</th>
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</thead>
<tbody>
<tr>
<td>Course participation environments</td>
<td>Finance, HR, Student, Research management systems</td>
</tr>
<tr>
<td>Access to materials, experiments publications</td>
<td>Communications</td>
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<tr>
<td>Student workbench</td>
<td>Content management</td>
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<tr>
<td>Group interaction, collaboration</td>
<td>Help-Desk</td>
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<tr>
<td>Information Commons</td>
<td>Web-Publishing</td>
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<tr>
<td>Information Literacy Programs</td>
<td>Space commons</td>
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Directors and Program leaders use a variety of performance measures to assess progress on realisation of the nine objectives to be met by that date. Unfortunately the time available for this review did not permit the reviewers to go into detailed examination of progress towards objectives. The self-evaluation and the input from major stakeholders, however, provide a good perspective on progress to date. A four point rating scale of leading – strong - sound – weak, was used. There was common agreement between the Divisional self-evaluation and the evaluations of stakeholders (with two minor more positive exceptions).

Action 1 Computational facilities are at the highest international standards with the National Supercomputing facility, a multi-gigabit network, sustainable digital repositories, leadership in the national e-science information GRID, including access software. **Assessment - leading**

Action 2 Information services that support innovation in teaching methods, learning materials and flexible learning processes. **Assessment - sound**
Action 3  Annual review and evaluation of information services, broad-based, to ensure a responsive infrastructure.  *Assessment - sound*

Action 4  Develop a digital assets program, including an E-print repository, a broad spectrum digital objects platform, open access materials, preservation of large-scale data sets, digital continuity and digitisation of archives, to manage preserve and access valued university materials.  *Assessment - strong*

Action 5  Consolidate on-campus information commons and library facilities and associated support facilities, not yet benchmarked.  *Assessment - strong*

Action 6  Strengthen the Information Literacy Program to address curricula development issues.  *Assessment - sound*

Action 7  Ensure Enterprise systems planning and implementation are aligned with university priorities and developed for varied roles across the university.  *Assessment - strong*

Action 8  Develop a broad information publication framework covering both digital and print media, including an ESP based Content Management System, Web meta-data, and E-Press.  *Assessment - sound*

Action 9  Provide leading-edge networked communication services with global connectivity from all points on ANU’s distributed campus.  *Assessment leading*

To the extent that it was possible consider these assessments within a Balanced Scorecard approach the review does not materially differ. Many developments are at early stages precluding evaluation of tangible outcomes, but are nevertheless critically important. Supercomputing facilities and research network services are definitely world class.

That said it is clear that the infrastructure for teaching in lecture rooms is not yet state-of-the-art. If input to the review is correct classroom technology is well behind the average in leading universities. We are inclined to accept those assessments because use of other common teaching technology like Web CT is not as widespread as we expected. In fact, there is a distinctly old-fashioned feel about the whole approach to teaching and interaction with students. Bringing the undergraduate teaching infrastructure up to date must have a high priority.

The reviewers believe the deficiencies discussed detract somewhat from what is otherwise an outstanding Division.

### 4.8 Facilities and Services

Facilities and Services (F&S) has for a long time had a good reputation for service in the University. It uses Service Level Agreements (SLAs) to set out expectations of both F&S and client units for building and maintenance services. The 2001 Review did not feel the need to go into detail, nor did it make any significant recommendations regarding improvements to F&S service levels. It concentrated on the need for the University to put higher priority on refurbishment of its current building stock, some of which resembles a fifties heritage museum.
The unit’s self evaluation pointed to the success of SLAs, to its practice of working closely with areas not just on individual projects but also master planning (eg, JCSMR and the Schools of Art and Music), and to its whole-of-client response attitudes. It also works with environmental concerns and needs such as child-care that might not otherwise get proper attention well to the fore. In general it prefers to work through consultative and deliberative procedures or reference groups depending on the problem to be solved. The fact that it does not have enough funds to meet all of the maintenance and refurbishment needs is overall its most serious worry (other than the perennial problem of suitable parking rules that every university has to live with).

Client feedback is favourable except that some clients baulk at the prices (whether for a refurbishment project or purchasing of equipment). Comparing like with like is always a problem, but full transparency of contracts and comparable specifications would be an advantage.

The reviewers do not have any problem with that favourable analysis. The Director, Warwick Williams, is a most experienced senior officer who clearly cares for the campus as if it were his own. But the challenges ahead will be new for him and different techniques may be needed. A recent case makes clear that there is a constant problem of avoiding graft and fraud wherever buildings and maintenance are involved.

The Vice-Chancellor, like an impoverished English Duke with a big estate, has initiated new thinking in an attempt to overcome the prospect of declining physical plant. Not yet carnivals and theme parks, but certainly allowing units to expand or refurbish using their own money, using F&S as project managers and outsourcing some parts of the project. Moreover the university may be investing more in revenue returning buildings so the demands for changes in F&S traditional ways will increase. They are challenges which will probably require some reorganisation of functions, new management challenges and new responses from staff.

Overall, however the Facilities and Service Division does a good job within limited resources

4.9 Marketing and Communication

The 2001 Review was not complimentary about the then Marketing and Public Affairs Division. It did not feel that much was happening in the unit, nor was it making a big contribution.

A reorganisation, a new head and new staff have revitalised the unit, now called the Marketing and Communication Division. It has vigorously moved to establish genuine marketing and a clear branding of ANU. It undertook extensive research both inside and outside the University to evaluate strengths and weaknesses. It found that the internal organisation was not optimal. There was little or no marketing intelligence, no clear brand or differentiation, and the University was reactive rather than proactive and it was lacking in marketing benchmarks.
The division has tackled these matters purposefully. It has sought to position the University in its target markets, confirm a public perception that the ANU is one of the world’s great universities, and market the University effectively. The Director has gone out to Research Schools, Centres and Faculties to ascertain their goals and marketing needs, and intends to repeat the process each year. To date it has a new structure, re-branded programs and a consistent look and feel to all University publications and advertisements, better media liaison, cost savings via centralised advertising production and media buying, better market research and other outcomes that contribute to improved marketing and communications.

There is evidence that spontaneous awareness of ANU has risen from 10 to 14 per cent, (fourth in relation to other universities), that recall percentage is greater than the percentage of spend (better than other universities), that there have been major changes in perception of ANU, and that there is increased awareness among potential postgraduate students.

The campus community’s perception of the work of M&C was mostly very favourable and appreciative, especially for the increased visibility of the University. There was even grudging acceptance that the creation of a common logo and ANU style, which included abolition of separate logos in academic Research Schools, Centres and Faculties, was a positive development. The Division also received favourable mention for the energetic, persuasive and professional style of the Director, Lee-Ann Norris, and the experienced expert, consultative and service-oriented advice of staff. The only jarring note concerned what were seen as complicated steps for advertising.

The reviewers concur that this Division has been transformed into a very good, professional unit.

4.10 Legal Office

Previous comments on the Legal Office were confined to the anomaly of its location within the Human Resources Division and the advantage of it being incorporated within a stronger Council and Boards Secretariat. The 2001 Review recommended that there should be no charging out for its services.

As the in-house legal advisor, the Office has by nature a client focus. In the ANU it endeavours to provide advice on demand without that legal advice being the only consideration. Areas that create work for the office include intellectual property, contract advice, governance, trade practice, and ordinary litigation in matters such as discrimination and administrative law. It provides short courses and advice in Trade Practices where needed across the campus.

Stakeholder input found the advice received always helpful, timely, comprehensive and comprehensible. The feedback suggested more proactive advice to heighten awareness of the availability of legal advice and, vice-versa, more networking to increase awareness of looming issues. By and large, ANU Legal Office was compared favourably with in-house university legal advice elsewhere. There was no demand for more outsourced advice.
The reviewers found that there was general appreciation of the Legal Office, both on account of its service approach and its avoidance of quibbling over pedantic points. The University Solicitor, Ken Grimes, is seen to give prompt, intelligible and solution-oriented advice.

4.11 Accommodation Services

The 2001 Review found that there were deficiencies in information-sharing and statistical analysis that could be removed. It said that there were advantages in moving to a more corporate response to the planning, development and operation of the Halls, with a shared capital base.

The self-evaluation says that there is now a more coordinated approach through the appointment of a Director and improved student client services as a consequence. There is the intention, though not the reality as yet, of coordinated or common planning, procedures, asset management and financial management. Integration of Accommodation Services with other University operations supports a culture of continuous improvement in the search for best practice. There is, of course, still an overall shortage of places for students.

University feedback attests to the continuing need for more coordination of student recruitment and planning, particularly international student recruitment, and more coordination of halls so that a seamless service to students can be delivered. The movement toward more sensible and justifiable business practices has begun.

The reviewers found the Director, Marie Wensing, to be energetic and keen to improve services. The computerised coordination of offerings of accommodation and the service to assist in listing and finding off-campus accommodation are appreciated by students. Tangible progress has been made and more improvements are in the offing.

The Director has tried to bring formerly independent Heads into a harmonious planning group, but there is still a considerable distance to go and progress could not be described as swift. We found it impossible to understand how Heads of Hall allocate places. Phrases like ‘for the good of the hall’ are simply cloaks for arbitrary, non-transparent criteria. Graduate students expressed somewhat negative views about accommodation services, mainly from the perspective of cost. More needs to be done at the University level to determine whether there is a need to provide for everyone who wants a place or whether halls should simply aim for the best economic outcome for the University – the two goals are not necessarily congruent.

Overall, despite the enthusiasm, the service at present is not better than average.

4.12 Council and Boards Secretariat

The 2001 Review proposed that there be a Council Boards and Legal Secretariat incorporating the Council and Board Servicing, a Legal Office and a Corporate Projects section. The unit has, however, been kept with a main focus on the Council and Boards.
The unit’s self-evaluation and our review of progress reveal a number of problems that the previous recommendation was intended to overcome. There are ways other than recommended in the 2001 Review of overcoming those problems, but they ought not to be ignored. Some examples of continuing needs are;

1. The Secretariat now has to provide the secretariat services for a drastically changed set of committees, including the paperwork associated with appointment of members and meeting and reporting arrangements, as a consequence of the formation of Academic Divisions and the existence of the National Institutes.

2. Decisions are placed on the Web via agenda papers and consequential minutes. Implementation is fostered via an action sheet to relevant officers. The desire for circulation of a succinct summary of the implications of decisions as guidance to the campus community cannot readily be met within the responsibility levels of staff within the Secretariat.

3. Systematic revision, refinement and promulgation of policies are still less than complete; the machinery is not adequate to the task.

4. The Secretariat does not have formal responsibility for the policy web-site or for the implementation of policies; it is not clear who does. A more effective way of promulgating decisions with unequivocal ownership accepted by the executive would assist everyone.

5. The timing and promulgation of decisions within Council and Boards must be with enough awareness of possible internal administrative repercussions. Cabinet-style comments from all conceivably effected, within strict timetables, should be considered. An apparently simple change in the name of a course or unit, for instance, may have a considerable flow on effect for the Finance, HR and Student Administration systems.

Input from other units indicated the belief that CABS is and has been responding well to change, continues to operate efficiently under considerable pressure, and has helpful and informed staff. The new (evolving) web is a distinct improvement on the previous versions. The major delegations document that is yet to appear would be the better for more consultation, and policy formulation and implementation need to be addressed consultatively.

The servicing function for the Council and Boards cannot be considered separately from the other issues of executive responsibility. It is clear that there is an efficient level of servicing, that is, the formation of the agenda, the collection and distribution of papers and minutes and the subsequent filing and web publication of these. The ceremonial functions are also well-handled.

It is no criticism of the staff of the Secretariat to say that despite these good features there is a fundamental weakness that only the executive can solve. In our view decisions and policies approved by Council ought not to be countermanded administratively, certainly not because one strong Head does not like a particular policy or does not want it to apply to his/her unit. Nor should it be the responsibility of middle level staff to decide how to summarise and communicate new policy documents or insist on compliance. All such matters are the responsibility of executive staff. In short there is structural weakness that needs to be remedied.
In the old days functions like this were handled by staff of the Registrar who took final responsibility. The nearest counterpart in the ANU is the Executive Director, Administration, who might very well be assigned the supervisory role, ensuring the efficiency of CABS, including efficient servicing, promulgation, implementation, and reporting of core policy decisions.

While the unit is efficient, it is not yet ‘fit for purpose’.
Chapter 5

Administration of Research Schools, Centres and Faculties

5.1 Previous Review

In the 2001 Review the reviewers pointed to the inconsistent and uneven administrative outcomes from the latitude Research Schools, Centres and Faculties have had to go their own way. There was a need to give more consistent meaning to the term 'devolution' some of which had occurred without sufficient guidance to enable the relevant staff to meet the requirements of legislation and essential accountability. A second problem was the absence of internal coordination arrangements within units and a third was the weakness of the links between devolved and central units.

That Review proposed that there be cohesive internal administration for each Research School, Centre and Faculty, including either a central services unit for small Centres or Faculties, or, preferably, combined administrative services for Schools, Centres or Faculties with similar functions, not just as a money saving approach, but also to gain some depth and possibilities for skilled administrative expertise.

The overriding problem, of course, common to the rest of the University, was the silo effect of people beavering away in isolation with little sharing of ideas, insufficient training and considerable mutual suspicion, including the feeling that additional devolution meant work being dumped, rather than that the scope for freedom of action and work economies was being expanded. So strong was the silo effect that in retrospect it is clear that some Research Schools and Centres had difficulty in publicly acknowledging shared values or even being part the ANU, stressing their own logos and the appearance of independence.

5.2 Developments

Since 2001 there have been major positive developments. They are:

1. The directions of future development of the University after wide consultation have been more clearly and explicitly stated in the strategic plan, ANU to 2005, which is now obviously a reliable University-wide guide to the ANU's priorities and plans.
2. Six of the ten Research School Heads and three of the seven Centre Heads are new to the position, coming into changing University expectations and processes, and into major changes in sources of funds and bringing with them new ideas and perspectives.
3. Equally there have been several changes in key administrative staff within Research Schools, Centres and Faculties, diminishing resistance to common administrative frameworks and processes.
4. Delegations have been revised to ensure nested powers that enable both the Head and staff within devolved units to exercise them, as desired by each unit.
5. There has been marked expansion of most of the units, bringing with that expansion increased budget flexibility and opportunities for changes in administrative arrangements. Some of the units hitherto thought to be too small to sustain their own administrations have expanded to the point where they run their own affairs.

6. The internal administrative arrangements of several of the units have been separately reviewed and new procedures instituted, most but not all of which have resulted in cohesive internal administrative services for each unit.

7. Key central units like Finance and Business Services, Human Resources, the Research Office, Student and Academic Services, have actively devolved more authority to units.

8. Central administrative divisions have become visibly more service-oriented, establishing regular forums and responding to individual unit needs more or less on demand.

9. Consultative apparatus such as the Business Solutions groups for ESP development and Service Level Agreement negotiations provide vehicles for discussion of tailored solutions for particular units and for general improvement of administrative processes.

10. Central units have put more effort into training for new processes, thereby ensuring common University processes.

11. More staff from devolved units have sought both training on particular processes and secondments to other units that will give them broader experience and enhanced skills.

12. The common commitment to an enabling culture has been sufficient to engender greater mutual cooperation and goodwill.

5.3 Problem areas

Induction The Human Resources Division is working to improve induction processes, but the insufficiency referred to in the discussion of Human Resources affects staff commencing service in devolved units even more than in central units. In the first week of service new staff should be walked and talked through essential personal information including where to go and how to get it and later have opportunities for more in depth induction to systems and processes.

Leadership training Human Resources has begun the essential task of bringing leadership training opportunities to the University. Heads of units chosen for their outstanding academic and research records cannot be assumed to have equivalent leadership skills and knowledge, much less knowledge of ANU processes and precedents. The goal here must be that every new unit head must have that opportunity.

Eliminating Fuzziness More devolution has been generally welcomed, but as indicated earlier there is remaining fuzziness such that each of central administrative divisions and devolved units may believe the other is responsible for a particular activity. The distinction between mandatory and optional requirements is not sufficiently clear. For instance, promotion or recruitment processes need to be clear enough for a devolved unit to know precisely what it has to do and how much scope there is for local variation, if any.
Overcoming duplication  The next steps in Finance and Business Services enhancement should attend to the specialised needs for management and accounting for grants in those units that are dependent on reporting in diverse formats to grants bodies. The aim should be to overcome duplicate accounting activity, both by the suitability and the reliability of the core financial systems.

Consultation  Devolution is not a one-way street. There needs to be awareness that any process, at any time, might well be reengineered and that consultation will bring the best results.

Coordination  As already outlined there is a need for greater coordination, the principle object of which, apart from a constant two-way flow of information and intelligence essential to good management, is to ensure that autonomy of units is enhanced, that duplication is avoided, and that there is uniform compliance with core policy and accountability requirements. This matter is taken up more fully in Chapter 6.

5.4 Appraisal

As indicated throughout the preceding chapters huge strides have been made towards better more adapted administrative services for and within Research Schools, Centres and Faculties. There is no more accurate word for relationships between the central units and devolved units than transformed. There is wide commitment to an enabling culture, the outcomes of such efforts being evident in all services and relationships. Not yet blissful, perhaps, but certainly quite different and better.

The review evaluates the relationships and processes as functional, compared to dysfunctional two and a half years ago. The expertise of staff both centrally and in the units is a step function better, both because of better attitudes and markedly better training. Although the coordination and sharing has further to go and the policy development system governing the whole system has further to go, the machinery is certainly much improved.
Chapter 6

Continuing Improvement

The fact that this Progress Report is expressed in such positive terms does not mean that the job is over or even that every problem is being tackled efficiently. As indicated in the relevant chapters there is scope for continuous improvement in all of the units, central and devolved. Continuous improvement should continue to be a primary goal. Matters affecting overall efficiency and effectiveness worthy of highlighting are further discussed below.

6.1 Pursuit of an enabling culture

The goal of an ‘enabling culture’ has proved to be motivational and mobilising, a phrase to which people relate. The concept has clearly encouraged people to commit to improvement of University administrative processes and systems, including personal commitment and action.

Most of the administrative divisions ‘own’ and are comfortable using it to explain and evaluate improvements. It is encouraging the adoption of flexible, adaptive and accommodating attitudes. The reviewers believe it has continuing relevance and usefulness for encouraging the next phase of improvement of administrative services.

6.2 Leadership, governance and coordination

Governance is often thought to relate only to the Council as the ultimate authority within the University. The ANU has so many autonomous units that even below the Council level there is a governance issue. Direct management of Research Schools and Centres for instance is not the tradition, nor the need. Far better that there is leadership in setting directions and aspirations, a framework of well understood policies and compliance requirements and maximally enhanced management room to move. The modernised version of this desirable situation is only partly developed as has been evident in discussion throughout this Progress Report.

As indicated, the CABS function needs strengthening. There is also a University coordination weakness that needs attention: Coordination is not just a device to enhance compliance. It has a planning, development and management function too. Ordering the relative importance of particular priorities is always a sensitive and skilled process. For instance, if Corporate Information Services has to choose between new developments in the handling of postgraduate enrolments and a new accounting module that will handle the internal requirements of units, how best are the interests of the University advanced? Two particular aspects merit further thought:

- Executive coordination Administrative priorities are always necessary. Many are defined in annual budget formulation processes.
Others, competing priorities especially, that need to be promptly resolved come up during the year. The terms of that resolution should then be communicated both to the University community and to an action officer accountable for efficient implementation of the decision. At present the Executive works a little too informally for optimal communication of the outcomes of many issues.

- **Coordination of Central Administrative Divisions** Directors of central administrative Divisions report to portfolio heads, Deputy Vice-Chancellors, the Executive Director, Administration, and the Vice-Chancellor, as shown in the organisation chart in Appendix 1. Although this organisational pattern works well for many functions there are three problems consequent upon this pattern of administration.
  - It may fall down when there are inter-portfolio or inter-divisional needs. Earlier we mentioned the perceptible gap in coordination of priorities.
  - There is also a need for a mechanism for bringing together administrative people reporting to different portfolio heads to build the best possible inter-divisional cooperation. A matrix perspective is essential.
  - No-one seems to have responsibility, as old-time Registrars once had, for efficient communication and implementation of decisions (e.g., to and from the CABS secretariat), for development of administrative processes, and for administrative problem-solving.

The reviewers believe that responsibility for these matters would most appropriately be located with the Executive Director, Administration.

### 6.3 Postgraduate research students

The considerable increase of over thirty-five per cent in postgraduate research student numbers has strained the system in more than one way. The reviewers noted particular instances in the relevant divisions. Discussions with the postgraduate student association confirmed our own impressions. Together they add up to another coordination problem for the University that needs to be tackled systematically. Those that came to attention were:

- **Enrolment processes** Paper-based files circulated around several units for up to six weeks before being settled.
- **Scholarships** Processes are not fast enough to allow full use of the scholarships available.
- **Shared responsibility** Arrangements for student supervision to be shared and the resources to flow to more than one unit proportionally do not seem to work smoothly.
- **Supervision** Postgraduate students are concerned about the unevenness of supervision, in that some supervisors do not know the rules and/or are arbitrary in following them (e.g., whether leave is possible and for what reasons). They asked us to bring to notice the extreme sensitivity for students in bringing supervision shortcomings to attention, suggesting that the skills, attitudes and
knowledge of postgraduate student rules of supervisors should be regularly checked.

6.4 Induction and training

Despite the many complimentary remarks about the near universal improvement in attention to communication and training throughout the University and the increase in opportunities for induction and career development training, led by the Human Resources Division, induction and training and personal development will continue to be a major need in all units as far ahead as can be seen. A core requirement is best encapsulated in the phrase each one teach one.

Each one teach one While there has been a noticeable erosion of the class distinctions that created various ‘us and them’ fissures, there are still elements of the old culture, of the stray shell-back arrogantly telling a senior administrator that but for him or her that administrator would not have a job.

In a modern university all staff should be both learners and teachers. Constant external and internal change makes the need for all to learn from each other paramount. The number of matters where success will only be possible if administrators and academics work together explaining to each other the details and peculiarities of programs have multiplied. Grant processes and systems require the combined skills and knowledge of both for success. Mutual respect should be a given.

For instance, academic promotion is an activity requiring both academics and administrators to work closely together to achieve fairness, via due process, without excessive bureaucracy. Heads of Schools and Centres and Deans need the same kind of meetings as administrators to explore the nuances (are oral preferable to written references? Does ‘up to four’ references mean none is also acceptable?) as well as the core rules. Administrators need input from academics as to the core issues from an academic perspective.

The following are a few of the multitude of other examples where academics and administrators working together, using each other’s special skills, will be essential to success:

- Changes in ARC, NHMRC and other competitive grants schemes
- Particular requirements for business donors
- Registration and exploitation of Intellectual Property
- Government graduate enrolments requirements
- The idiosyncrasies of the ESOS Act for international students
- Government requirements for projects abroad
- Cooperation between units in offering courses and programs
- Revised devolution arrangements to suit particular units.

6.5 Benchmarking
The reviewers do not want to overstate the importance of benchmarks because it is not possible to quantify important matters such as enthusiasm and morale. But benchmarking does focus the mind on how well a service or process is meeting its objectives. It also encourages reflective examination of whether particular measures are the right ones to indicate success. And it should focus both on improvement from a defined starting point towards the University's goals and quality relative to national and international benchmarks.

The key issue must always be the validity of particular measures for the ANU. The number of books in the library or the space per student or staff member relative to Melbourne, Sydney, Harvard or Oxford universities may have little or no modern relevance. In short, the opportunity and the need is for ANU to be constantly asking itself what is truly important, in this case administratively, but equally for academic matters. The response defines the university's priorities and its ultimate success.

As indicated earlier in relation to progress on the tenth key proposal, administrative benchmarking activity is a satisfactory work-in-progress at the ANU. It should be further encouraged.
Appendix 1:

Terms of Reference

For a quality review of the Australian National University

The Council of the Australian National University, in accordance with its overall responsibilities for the performance of the University, has initiated an independent, external Review of the quality of its performance. The Review will comprehend research and scholarship, research training, undergraduate teaching and learning, postgraduate teaching and learning, national and regional community service, and internationalisation.

The Review is intended to inform the University and the Australian public about the standing of the ANU in the international academic community and about the best ways of developing the potential of the ANU for Australia’s longer term national interest. The Review will focus on the quality of the results achieved by the ANU through its various outputs.

The ANU Quality Review Committee will finalise a report to the ANU Council before November 2004 on the following matters:

vi. the quality of ANU research;
vii. the quality of ANU research training;
viii. the quality of ANU undergraduate and postgraduate education;
ix. the impact of the ANU’s regional and national service; and
x. the strength of the ANU’s international engagement.

The Council will publish the final report of the ANU Quality Review Committee and will also make public its response to the findings and recommendations of the Committee.

1. the quality of ANU research

1.3 The Review will report on the quality of research activities, with reference to international and national benchmarks of research excellence. The review will encompass all the research activities of the university and will assess the quality of the research performed in the distinctive academic clusters of the ANU - the Institute of Advanced Studies, University Centres and The Faculties, separately and collectively. While acknowledging the separate structural components, the Committee will comment on the overall research strength of the ANU and the synergistic relationships that are developed or could be developed.

1.4 The ANU Quality Review Committee will employ peer review methods and have regard to bibliometric and other data, and the outcomes of competitive processes, for assessing the quality of research activities. In particular, the Committee will pilot the use of a research outcomes assessment exercise in the Australian context and report on its possible wider application. The views of business and public users of research in Australia will also be taken into account.
1.3 The ANU Quality Review Committee will report on:
1.3.1 the excellence of ANU research;
1.3.2 the international reputation of ANU research;
1.3.3 the national significance of ANU research;
1.3.4 the ANU’s management and development of intellectual property;
1.3.5 the quality of the ANU research environment;
1.3.6 the development of research careers of staff;
1.3.7 the strength of the ANU’s networks for research collaboration; and
1.3.8 emerging fields and inter-disciplinary areas of research of importance to the ANU.

2. the quality of research training

2.1 The Review will report on:
2.1.1 the quality of the ANU research training environment;
2.1.2 the quality of the research student experience; and
2.1.3 the capabilities of research graduates.

2.2 The ANU Quality Review Committee will make use of the results of surveys and other measures of the capabilities and satisfaction levels of graduates and their employment destinations.

3. the quality of ANU undergraduate and postgraduate education

3.1 The Review will report on:
3.1.1 the quality of ANU education at the undergraduate and graduate levels;
3.1.2 the special character of ANU education in a research-intensive environment;
3.1.3 innovative features of course design and delivery; and
3.1.4 the attributes of ANU graduates.

3.2 The ANU Quality Review Committee will make use of comparative indicators student satisfaction, and surveys of graduate satisfaction and employment destinations. The Committee will also have regard to curriculum materials, and documentation of teaching and learning practices and associated evaluations.

4. the quality of ANU service to national and regional communities

4.1 The Review will report on:
4.1.1 the performance of the ANU as Australia’s national university;
4.1.2 the contribution of the ANU to public debate, scientific advancement and cultural development; and
4.1.3 the regional community benefits of the ANU.

4.2 The ANU Quality Review Committee will make use of available statistics and reports on staff participation in public discussions and advising. The Committee will also take account of the views of national and regional users of ANU services.

5. the quality of the ANU’s international engagement

5.1 The Review will report on:
5.1.2 the quality of the international student experience;
5.1.3 the capabilities of ANU graduates for international employment;
5.1.4 the extent and quality of ANU research collaboration internationally; and
5.1.5 the quality of service to the international community.

5.2 The ANU Quality Review Committee will assess the ANU’s policy documentation, including international agreements and memoranda of understanding, and have regard to the findings of surveys and focus groups of students and staff, and the satisfaction levels of graduates.

Other Matters

A. In reviewing the performance of the Institute of Advanced Studies, the ANU Quality Review Committee will report specifically on:
   i. the capacity of the Institute to sustain excellent long-term, basic research; and
   ii. the appropriate future level of block funding for the Institute.

B. In evaluating the overall quality of ANU outcomes, the Committee will comment on general policy principles, organisational arrangements and administrative procedures for providing robust support to the ANU’s relentless pursuit of excellence.
APPENDIX 2

REVIEW COMMITTEE MEMBERSHIP

Chair:

**Professor Deryck Schreuder**, former Vice-Chancellor and Principal, The University of Western Australia.

Members:

**Dr Tom Everhart**, former President, California Institute of Technology.

**Professor Deborah Freund**, Vice-Chancellor and Provost, Syracuse University. NY.

**Professor Franz Kuna**, former Pro Vice-Chancellor (Teaching and Research), Klagenfurt University, Austria.

**Professor Sir Colin Lucas**, Vice-Chancellor, University of Oxford.

**Ms Heather Ridout**, Chief Executive, Australian Industry Group.

**Professor Frank Shu**, President, National Tsing Hua University, Taiwan.


**Dr Jan Veldhuis**, former President, Utrecht University, The Netherlands.

**Professor Sir David Williams QC**, former Vice-Chancellor, University of Cambridge.

*The Chair of the Committee sought input from Professor Jeremy Knowles (Dean, Faculty of Arts and Sciences, Harvard University) and Dr Rita Colwell (Chair, Canon Life Sciences and former Director, National Science Foundation).*
Appendix 3

GUIDELINES FOR EXTERNAL ASSESSORS

We are asking you to assess the quality of ANU research in your field of expertise. External assessments are an important part of the current review of the quality of ANU research.

Each ANU researcher has identified up to 5 of his or her best research works published or exhibited over the period 1995-2003. Early career researchers, in particular, may have submitted fewer than 5 items.

You are asked to sample the research works submitted to you, consider the supporting information provided in the Context Statements, and report your assessments, on the enclosed Evaluation Report.

Deans and Directors of Faculties, Research Schools, and University Centres have written Context Statements explaining how the works you are assessing fit within their areas. These Context Statements contain the areas’ self-assessments using the rating scales below:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Centiles</th>
<th>Descriptor</th>
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<tbody>
<tr>
<td>ES</td>
<td>96-100</td>
<td>Exceptionally significant. Research that falls within the top 5% of all research in its field internationally, or makes an equivalently exceptional contribution to research in an area of particular significance to Australia.</td>
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<tr>
<td>IE</td>
<td>76-95</td>
<td>Internationally excellent. Research that falls within the top 25% of its field internationally, or makes an equivalently excellent contribution to research in an area of particular significance to Australia, (but that does not fall within the top 5%)</td>
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<tr>
<td>HQ</td>
<td>51-75</td>
<td>High quality. Research that is of higher than average quality compared to all research in its field internationally, but not in the top 25%</td>
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<tr>
<td>AQ</td>
<td>21-50</td>
<td>Acceptable Quality. Research of lower than average quality compared to all research in the field internationally, but not in the bottom 20%.</td>
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<tr>
<td>PQ</td>
<td>1-20</td>
<td>Unacceptable. Research output in the bottom 20% of its field internationally.</td>
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</table>
We would like you to judge the proportion of the research works submitted that rate as world class, in your sub-discipline, for each of the academic organisation units of the University active in that field of research. We define ‘world class’ as that research which is rated within the top 25% internationally in a field. We would also like you to estimate the proportion you consider to be especially significant, superb research, in the top 5% of international research.

The following points may be helpful in guiding your assessment:

- We do not expect you to read all the work presented. We expect you only to sample the work. Make your judgement based on your knowledge of the reputation of researchers, the quality of journals and the quality of the work.
- Sample the work that falls within your primary area of research expertise. You are asked to indicate the number of works you have sampled (including those already familiar to you).
- If you wish, you should be able to access many of the items electronically from the material we have given to you. Electronically-available items are marked. If you wish to see other materials please let us know early and before 4 June, so that we can arrange to post them to you. You may contact assessor.support@anu.edu.au to order the hard copy materials you wish to examine.
- Bear in mind that this exercise is not an overall evaluation of the totality of the ANU’s research outputs. Rather, it is an attempt to capture the highest level of research quality attained by each of the researchers at the ANU, and measure this level of quality in terms of international standing. Hence, it would be expected that the distributions will be skewed to the upper end of the scale, given that it is the very best of the ANU’s output that is being assessed in the context of research in the field overall.
- We would appreciate receiving your completed Evaluation Report before 18 June. Please note that we may not be able to make use of reports received after 25 June.

Please note that references to academic levels of appointment of staff have the following meanings:

E = Full Professor
B = The level of Associate Professor
C = Mid-career researcher
B = normally early-career researcher
A = Post-doctoral fellow

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78 A useful conceptual analogy might be afforded by the ranking of world-class sports teams. Quality is measured by the team’s best performances rather than an aggregation or averaging of all performances.
## Appendix 4
### Participating Assessors

<table>
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<tr>
<th>Discipline</th>
<th>RFCDs</th>
<th>Assessor</th>
<th>Institution</th>
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<tr>
<td>Asia-Pacific Studies</td>
<td>various</td>
<td>Professor B Comrie</td>
<td>Max Planck Institute for Human Development</td>
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<td></td>
<td></td>
<td>Professor L Visser</td>
<td>Wageningen Universiteit - Leerstoelgroep Rurale</td>
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<td></td>
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<td>Dr A G W Turton</td>
<td>University of London</td>
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<td>Dr T P Bayliss-Smith</td>
<td>University of Cambridge</td>
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<td>Professor Pang Eng Fong</td>
<td>Singapore Management University</td>
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<td>Professor R Lucas</td>
<td>Boston University</td>
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<td>Professor E B Barbier</td>
<td>University of Wyoming</td>
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<td>Professor A Kokko</td>
<td>Stockholm School of Economics</td>
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<td>Professor V L Martin</td>
<td>University of Melbourne</td>
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<td>Professor J O'Connell</td>
<td>University of Utah</td>
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<td>Dr T W Bigalke</td>
<td>East West Center, Hawai‘i</td>
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<td>Professor B K MacDonald</td>
<td>Massey University</td>
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<tr>
<td>Astronomical Sciences</td>
<td>2401</td>
<td>Professor M Deuchler</td>
<td>SOAS: The School of Oriental and African Studies, University of London</td>
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<td></td>
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<td>Professor A D Gordon</td>
<td>Harvard University</td>
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<td>Dr M McGlone</td>
<td>Landcare Research, New Zealand</td>
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<td>Professor F Dikotter</td>
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<td>SOAS, University of London</td>
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<td>Professor T J Pempel</td>
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<td>Professor J A Tickner</td>
<td>University of Southern California</td>
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<td>Dr T J Huxley</td>
<td>International Institute for Strategic Studies, London</td>
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<td>Professor S G Firth</td>
<td>The University of the South Pacific</td>
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<td>Professor P G Riddell</td>
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<td>Professor B W Carney</td>
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<td>Professor B Warner</td>
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<td>Professor J Huchra</td>
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<td>Professor J Silk</td>
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<p>| Policy and Political Sciences | 36 | Professor J Briden            | University of Oxford                              |
|                              |     | Professor J Millar            | University of Bath                                 |
|                              |     | Dr R K Carty                  | University of British Columbia                     |
|                              |     | Professor B J Galligan        | University of Melbourne                            |
|                              |     | Professor A Gamble            | University of Sheffield                            |
|                              |     | Professor P J Katzenstein     | Cornell University                                 |
|                              |     | Professor R Hardin            | New York University                                |
|                              |     | Professor Sir L D Freedman    | King's College London                              |</p>
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