



Macquarie University

**Research and Research Training Management Report
(Abridged Version)**

2007

Preamble (Note to Reader)

In the past, Research and Research Training Management Reports (RRTMRs) for a particular year have normally been prepared towards the end of the third quarter of the following year. The timing was largely dictated by the annual institutional visit by DEST, but it also allowed institutions to include comparative data - benchmarking against national performance data (such national data being released by DEST immediately prior to their visit).

Over the last two years DEST has not required institutions to submit RRTMRs. Despite this the Office of the Deputy Vice-Chancellor (Research) at Macquarie has seen value in continuing to produce an annual Report, at least in an abridged form.

The fact that DEST does not release national performance data for the previous year until at least the third quarter of the following year means that 2007 national performance data will not be available until at least September 2008. This has the consequence that, while this Report may contain some performance data for Macquarie for 2007, and even 2008, most data, and especially all comparative data, is for 2006. Further to this point and because this Report was prepared earlier than usual (January 2008), it is important to realise two things:

1. Some data for Macquarie's performance in 2007 was unavailable. Under the performance areas of research income and HDR performance, results must be considered preliminary as they were all unaudited. Under the performance area of publications, data collection was incomplete (only about 40% of 2007 publications having been reported to IRIS by staff) and so 2006 performance data was the latest available.
2. As indicated above, comparative data (re Macquarie's performance relative to National performance or to other groups of universities or individual institutions) relies on publicly available (verifiable) data published by DEEWR (DEST) or Universities Australia (AVCC). At the time of writing, the latest available data was for 2006 (but sometimes only 2005).

Introduction

Upon his appointment as Vice-Chancellor in 2006 Professor Steven Schwartz announced his vision for the University as a research intensive university by way of his Macquarie@50 paper (<http://www.research.mq.edu.au/policy/documents/macquarieat50.pdf>). This vision was translated into a Research Strategic Plan, (http://www.research.mq.edu.au/policy/documents/MQRSP_2006_Plan_ResAct_revised_Feb07.pdf) which, even though analysis of performance is usually by necessity retrospective by at least a year, has already begun to noticeably influence the University's research performance.

The University's Research Strategic Plan has four major key objectives. In summary they are:

1. To establish a pervasive research culture across all areas of the University
2. To achieve prominence in research in selected concentrations of research excellence internationally and nationally
3. To maximise research outcomes by increasing the number of high quality Higher Degree Research (HDR) commencing candidates and completions
4. To be a significant contributor to the Nation's economic, social and cultural well-being

The University continually monitors its performance against these key objectives. In this Report various aspects of the University's performance are measured both using internal benchmarking (current performance versus performance in previous years), as well as bench markers against the National average.

A major initiative arising from the Macquarie@50 paper was an expansion of the number of research active staff. Before embarking upon a concerted recruitment drive the University defined its key areas of research strength. These areas, defined as Concentrations of Research Excellence (COREs), were carefully chosen to represent groupings of researchers whose performance indicators demonstrated them to be of the highest international quality. Each CORE was then allocated a budget for the recruitment of additional researchers. This process began towards the end of 2006. Twelve months later 41 additional members of staff, all with excellent research records, had been attracted to the University. Macquarie is committed to additional recruitment over the next five years, not only to the existing COREs, but also to new COREs yet to be established.

In benchmarking itself internationally, Macquarie University inevitably runs into the problem of its faculty mix. In the past Macquarie has suffered from an incomplete faculty mix in that it had no Faculties of Medicine, Engineering or Agriculture. The absence of a Faculty of Medicine in particular put the University at a huge disadvantage in that it has limited capacity to access one of the major sources of research funding (in Australia medical research funding constitutes almost half the total research funding available). The establishment of the Australian School of Advanced Medicine (ASAM) at Macquarie in 2007 will certainly change this situation over the next five years. The University is also aiming to expand its Engineering capacity. In Macquarie's case "Engineering" will be mainly in the high-tech area of the discipline. At least three of the new COREs are in this category, and expansion of the COREs program will boost the Medicine/Engineering areas.

In the next section Macquarie's research and research training performance will be outlined in four main areas: Quality, Publications, HDR Students and Research Income.

Summary of Performance Indicators

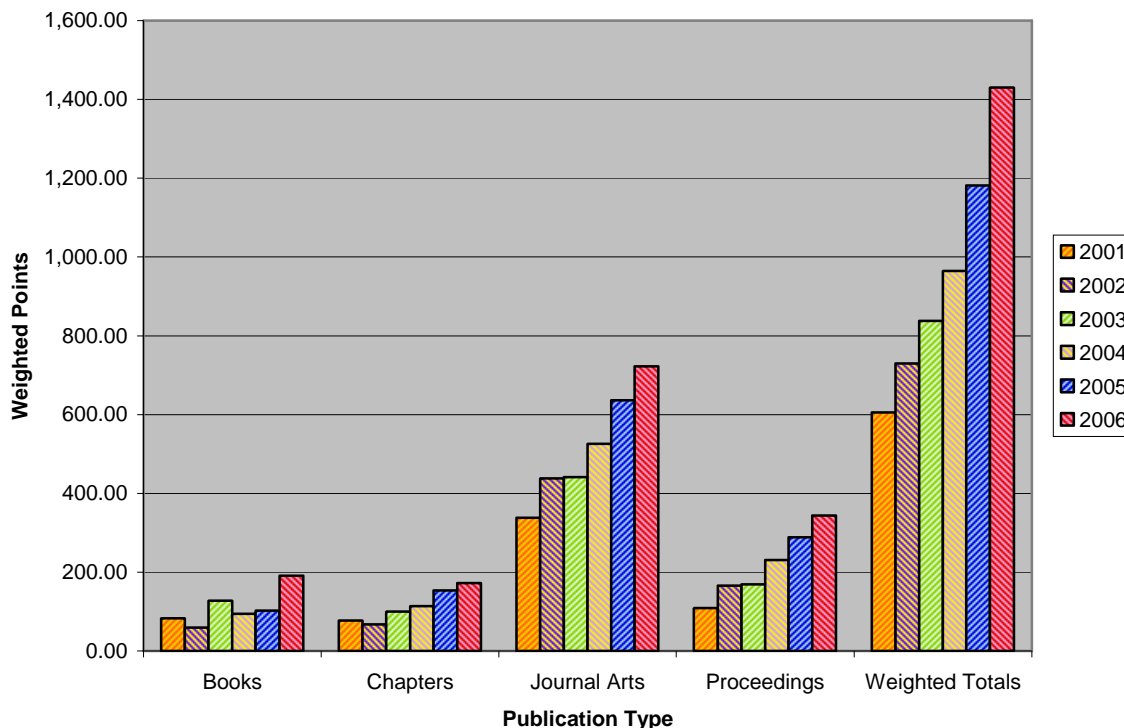
In 2007, as part of its preparation for the proposed Commonwealth Government Research Quality Framework Exercise, the University undertook an assessment of the research Quality of its research active staff. In undertaking this Trial the University had first to define the term “Research Active”, and then determine staff eligible to participate in it. The primary indicator for research activity was determined to be peer-reviewed research publications (DEST proxies) – a minimum of four outputs over the period 2001 – 2006 was required, consistent with the proposed RQF eligibility conditions (for details see later in this Report). Using this definition it was found that 71% of the academic staff complement (levels B–E) met the definition. For all academic staff (levels A–E), research activity was 67%.

A previous exercise undertaken in 2003 based upon a slightly different set of criteria (using a definition of “research active” requiring either supervision of an HDR student or publication of a DEST proxy output *in the previous year*) showed the University’s number of research active staff as 62% (level B–E) or 49% (levels A-E). The increase in research active staff is real, partly because of increased weight given to research staff recruitment, and partly because of significant improvement of staff research outputs.

Performance in Publications output has shown strong improvement – see Chart 1. Over the period 2003 - 2006, Publications output in DEST Proxy categories has increased by 18.3% each year, compared to a National increase of only 9.9%. That is, the University’s increase in output has been about double the National average.

Chart 1

MQ Weighted Publications (DEST Proxies) 2001 - 2006



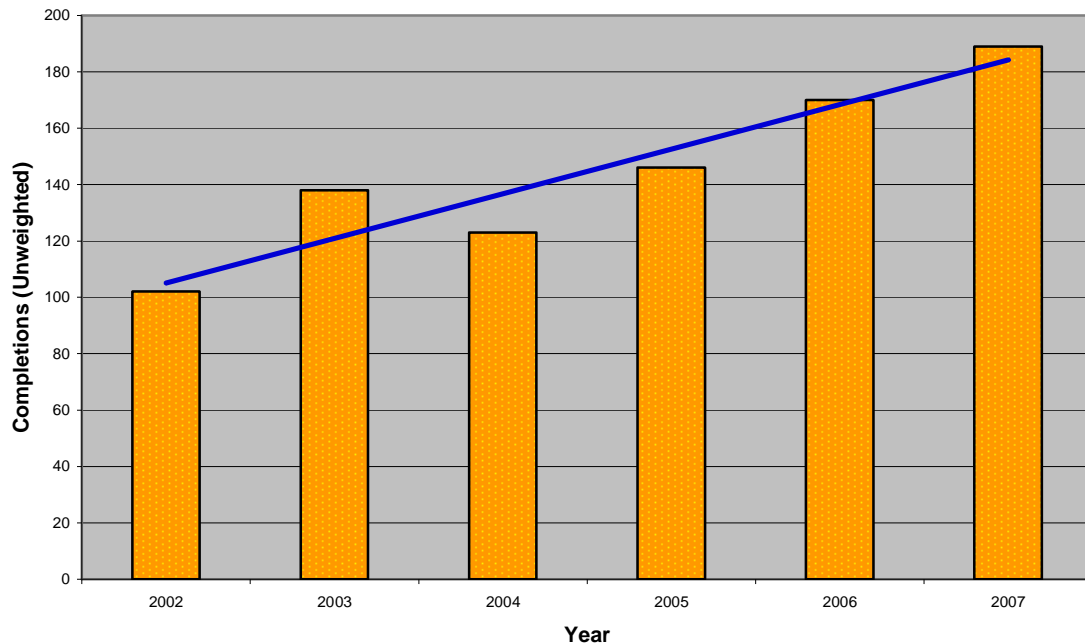
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The University's performance in terms of HDR Completions has also shown a consistent improvement – see Chart 2. Over the period shown Macquarie's performance has increased on average by 12.2% each year. This is to be compared with a National increase of around 4.7%.

From 2008 the University's main goal with regards HDR performance is to increase completions rates – that is, increase the completions/enrolments ratio.

Chart 2

Macquarie - HDR Completions 2002 - 2007



Another indication of the University's HDR performance is the Postgraduate Research Exit Questionnaire (PREQ) operated annually by DEST. The Survey asks HDR students who have completed their degree to rate their university against certain criteria. Over the period 2004 – 2006 Macquarie's ratings on the seven criteria have increased substantially, so that we are now above or equal to the national average on five of them. In particular, ratings for "Overall Satisfaction" and "Supervision" have increased significantly, as shown in Charts 3 and 4, respectively. For more on this subject – see later in the Report.

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Chart 3

PREQ 2004 - 2006, "Overall Satisfaction" Criterion, Macquarie vs National Average

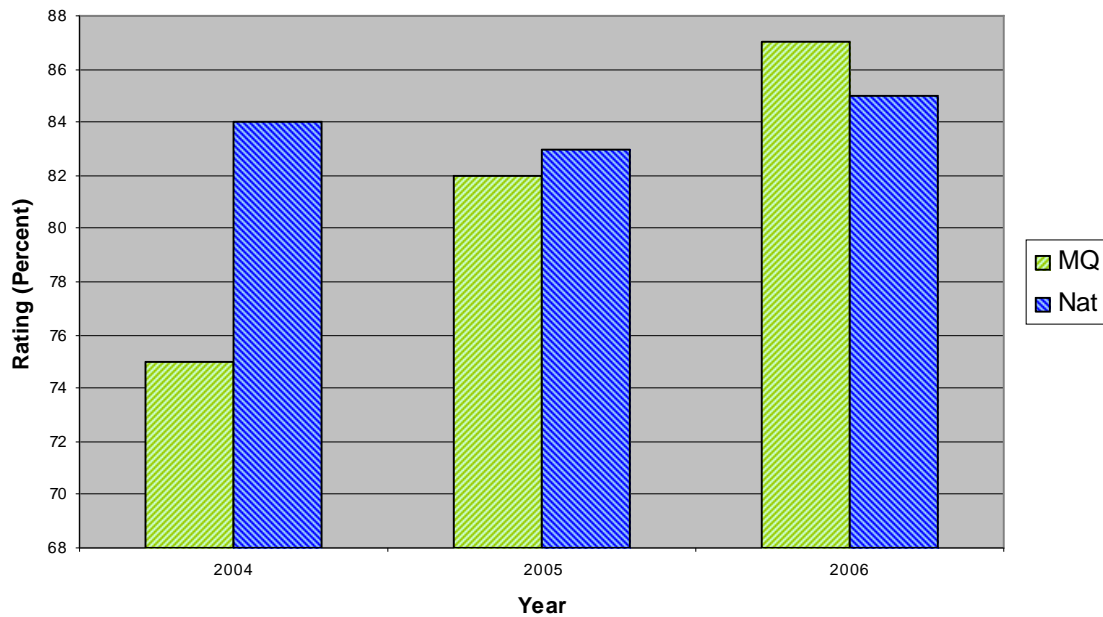
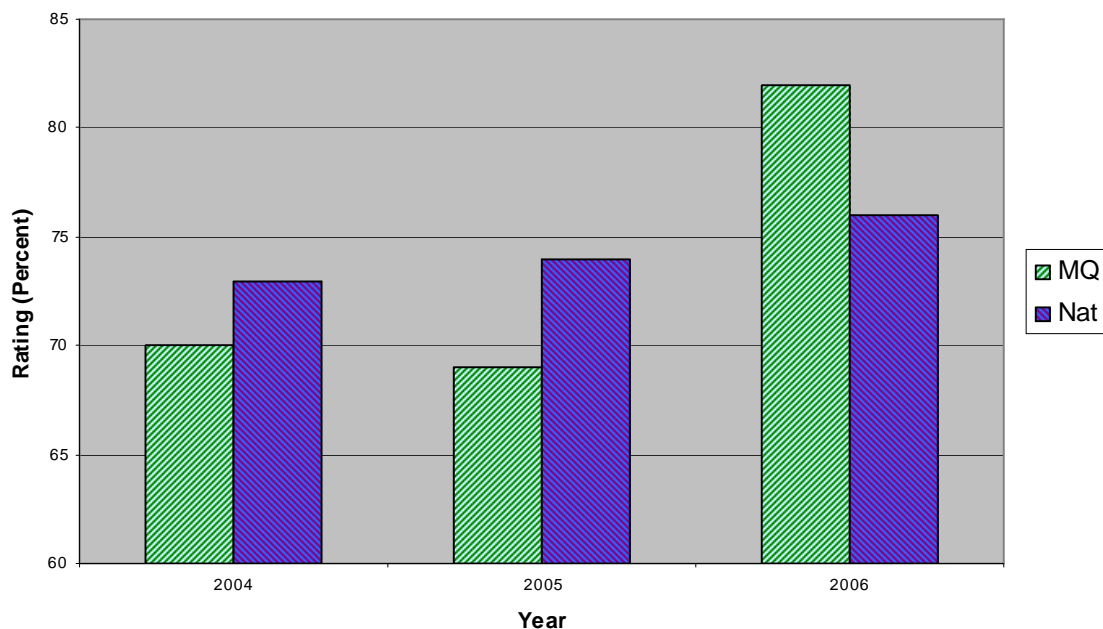


Chart 4

PREQ 2004 - 2006, "Supervision" Criterion, Macquarie vs. National Average



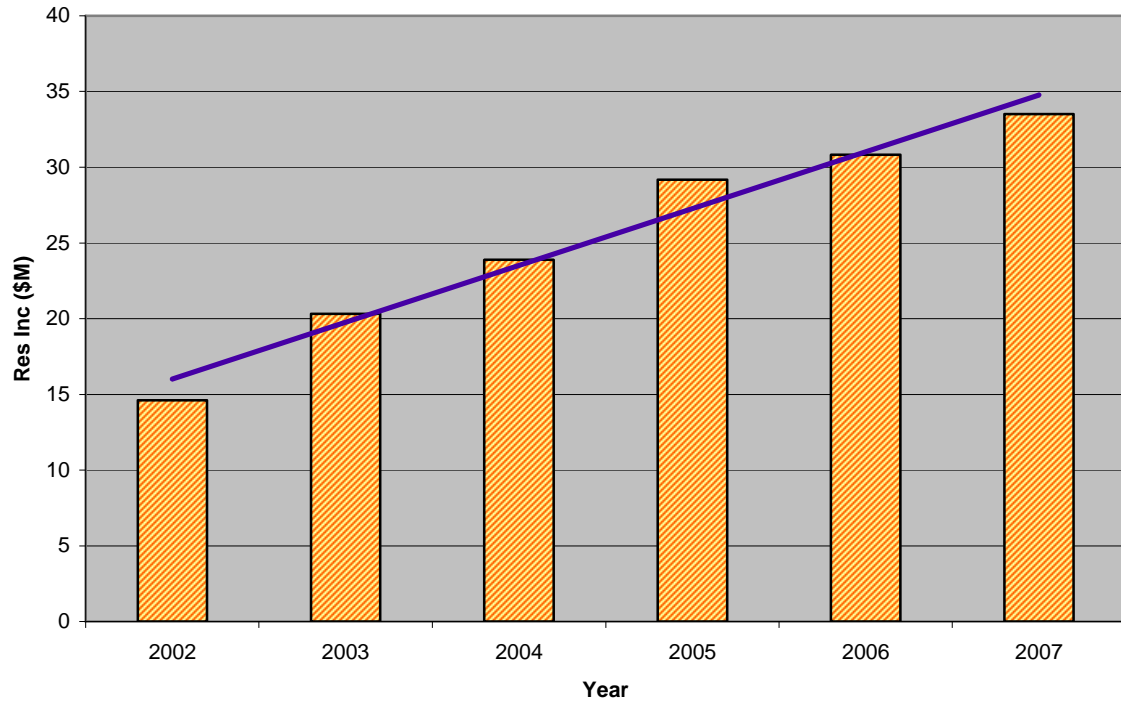
Historically Macquarie was more dependent upon ACG funding, particularly that from the ARC, than was the case with many other Australian universities. Our performance in ACG has continued to be strong, but diversification of the University's funding base has dropped ACG funding from around 60% to less than 50% in the past five years, while there has been a sustained increase in total research income over the period.

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Chart 5 shows total research income for Macquarie, 2002 – 2007. Over the period shown Macquarie has averaged a 26.3% increase each year. This is to be compared with a National increase of around 13.0%.

Chart 5

Macquarie - HERDC-Reportable Research Income (\$M), 2002 - 2007



More detail on these three performance indicators can be found later in this Report.

Research Strategy and Profile

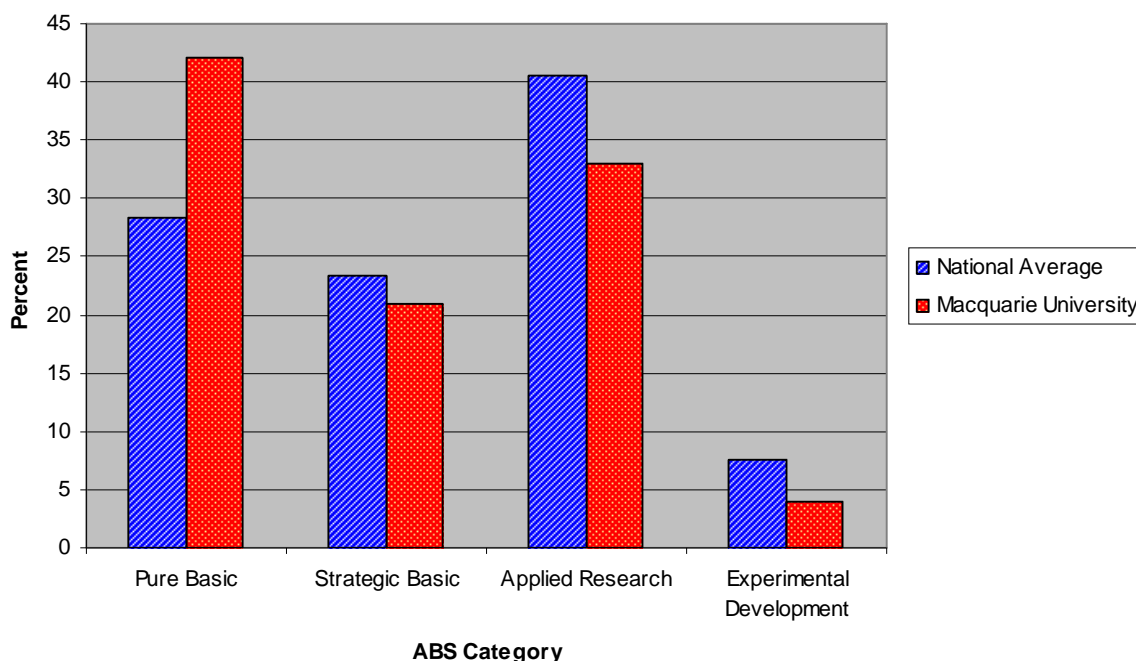
Overview

In 2006 the University developed a new Research Strategic Plan (available at http://www.research.mq.edu.au/policy/strategic_directions). This plan sets out goals and performance indicators for the University for the next 3 – 5 years. The following section sets out Macquarie University's status and performance over the last 5 - 6 years.

The University's research profile as represented by the Australian Bureau of Statistics 2006 data collection of research interests of staff (Chart 6) is characterised by a strong emphasis on pure basic and strategic basic research, consistent with our emphasis on the fundamental academic disciplines in the Humanities and Social Sciences, Commerce and Science. Over the last three RRTMRs there is a small but noticeable trend away from the Pure Basic research towards strategic and applied research. This is consistent with the broadening of the University's research funding base.

Chart 6

Macquarie Profile - ABS Categories of Research (2006 Data Collection)



As indicated in the Introduction, the University is strengthening its research performance in the areas of medicine and engineering. It is expected that this will further move the Macquarie profile as shown in Chart 6 even further towards the Strategic/Applied Research categories.

Further Analysis of Research and Research Training Performance

Publications

The growth of our research outputs is illustrated by the historical profile of DEST proxy publications shown below (Chart 7). Also shown (Chart 8) is publication data 2003 - 2006 in the form of total weighted DEST proxy points as a percentage of the total for the sector.

Chart 7

MQ Publications, including Unweighted Totals, 2001 - 2006

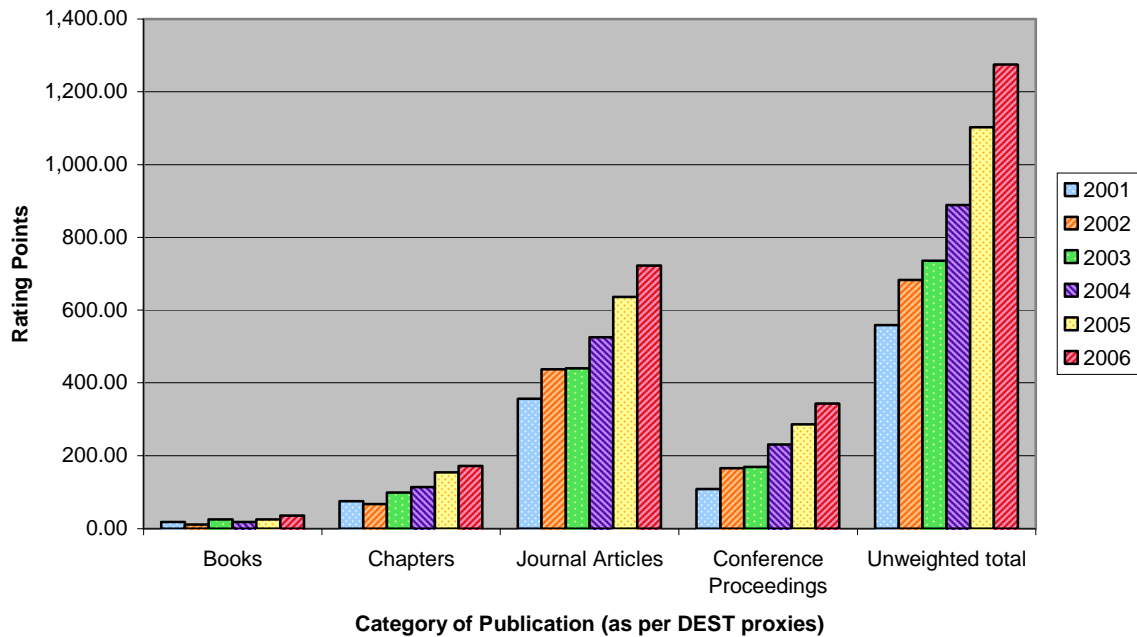
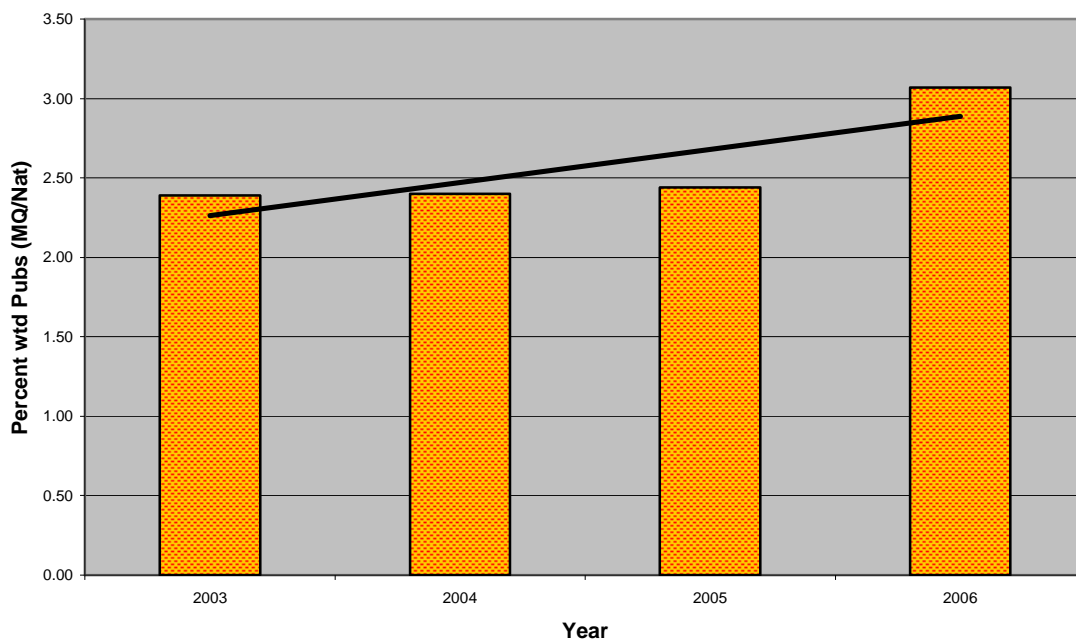


Chart 8

Percent Macquarie vs. National Total Weighted Publications 2003 - 2006



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Chart 9 shows weighted publications for Macquarie over the period 2001 – 2006. While the data for books and book chapters is a little variable (explained by relatively small numbers), performance across all categories showed a steady increase, and indeed an overall improvement 2005, 2006. The fact that this is a real improvement can be seen in Chart 10, which shows that Macquarie's performance relative to the National average has consistently increased in relative terms over the period.

Chart 9

MQ Weighted Publications (DEST Proxies) 2001 - 2006

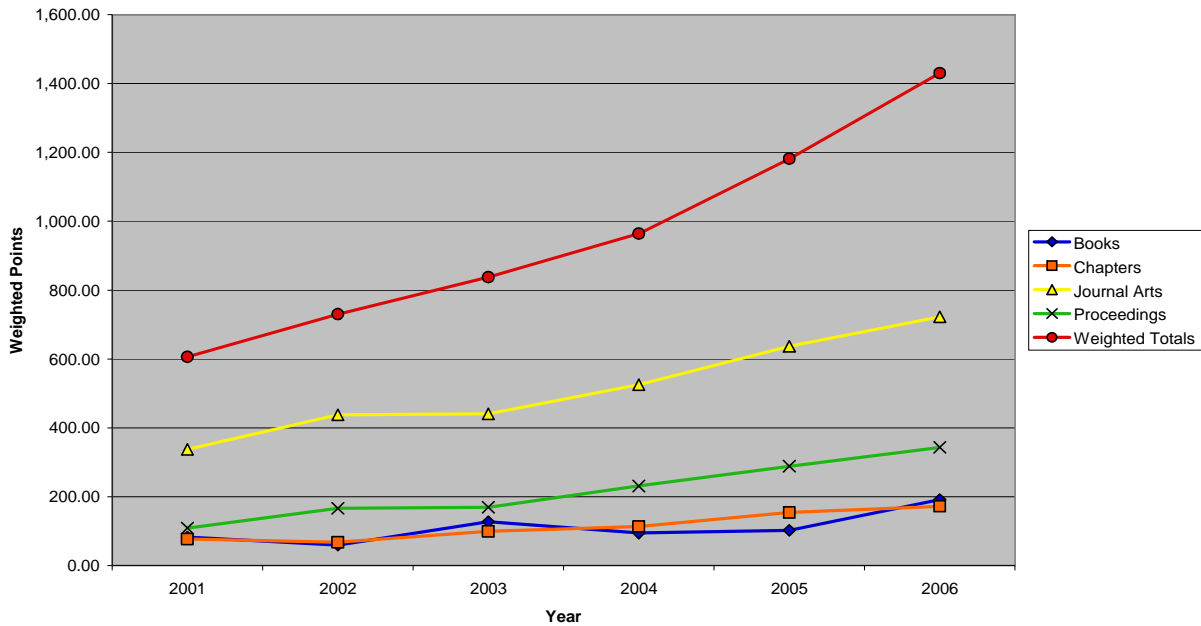
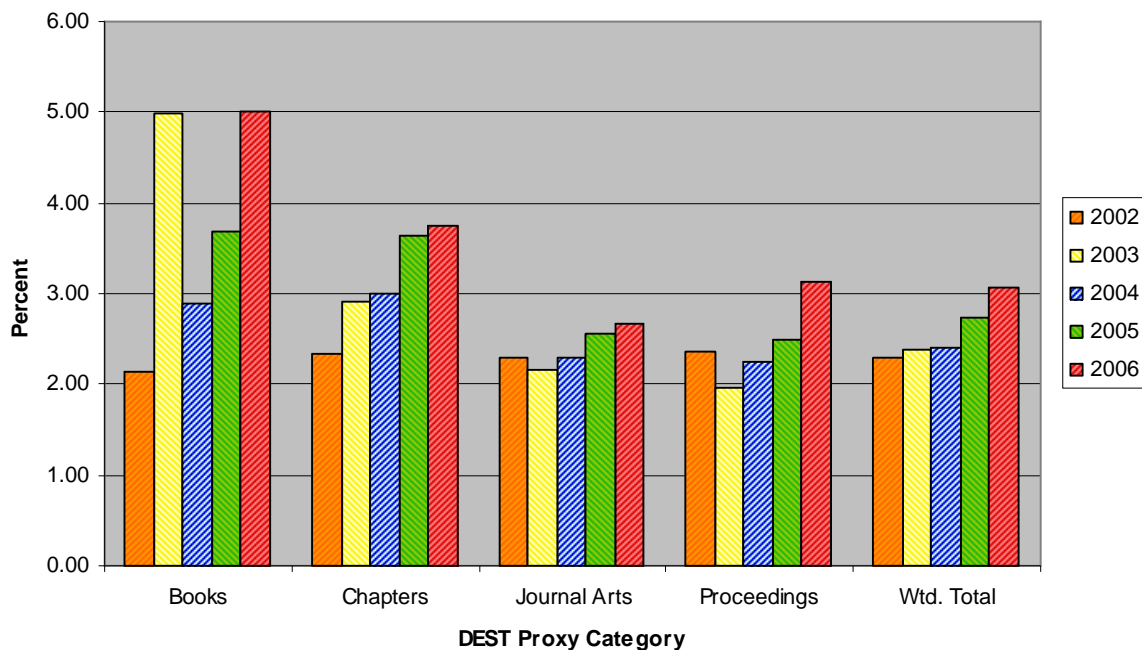


Chart 10

MQ/National (%) Weighted DEST Proxy Publications 2002 - 2006



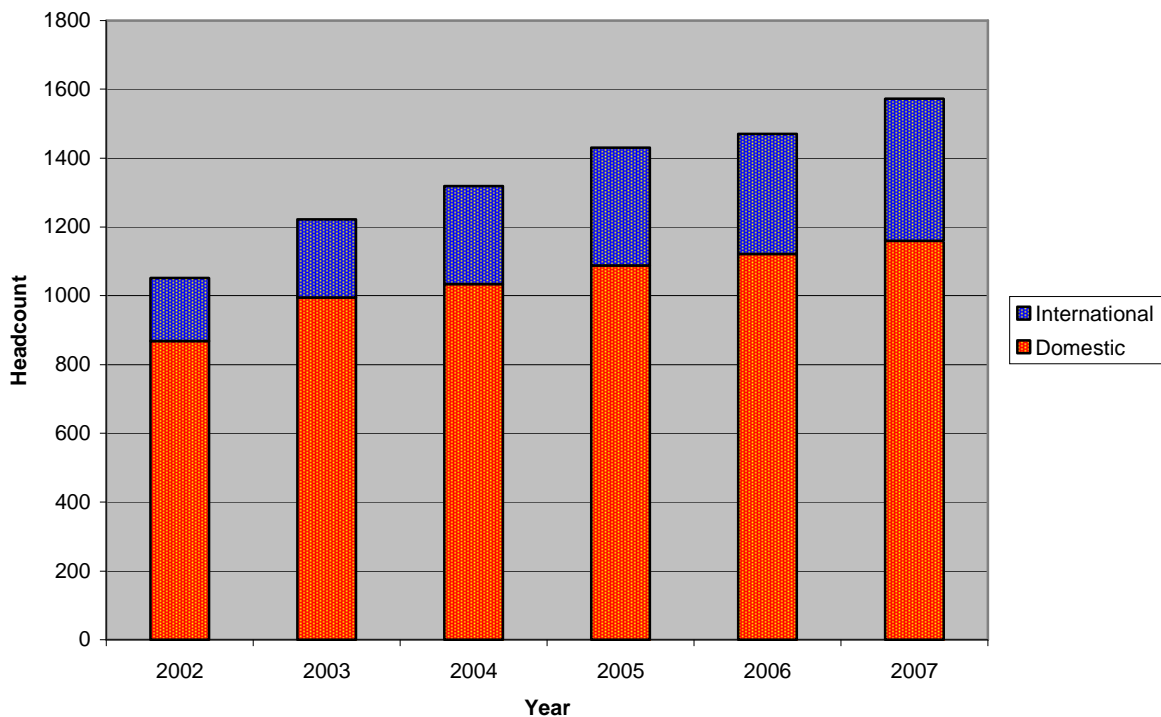
HDR Performance

Macquarie University recognizes that maintaining a strong program of Higher Degree Research (HDR) is critical to the health of our overall research program. In 2005 the undertook radical restructuring of its HDR program and over the past two years have introduced a compulsory HDR Commencement program for all students, and replaced the former Postgraduate Studies Committee (which dealt with postgraduate coursework and HDR programs) with the Higher Degree Research Committee (HDRC, responsible for HDR policy and quality processes).

Growth in HDR student numbers and load over the period 2002 - 2007 is shown in Chart 11. It is noteworthy that there have been steady increases in both domestic and international students over the period.

Chart 11

HDR Student Headcount 2002 - 2007

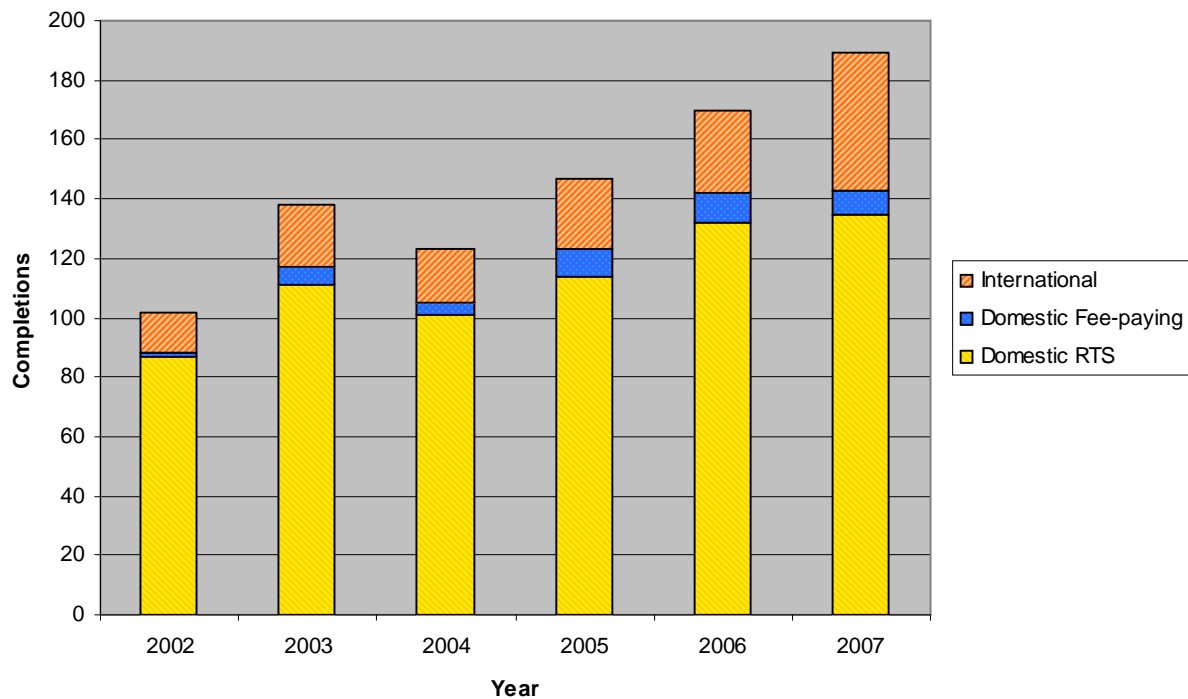


Since 2006 a key strategy of the University has been to both increase Completions in absolute terms and improve Completion rates relative to enrolments. Chart 12 shows HDR Completions over the period 2002 – 2007. The significant increase in Completions in 2007 demonstrates that the University’s strategies are working.

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Chart 12

HDR Completions (Domestic/Fee Paying/International) 2002 - 2007

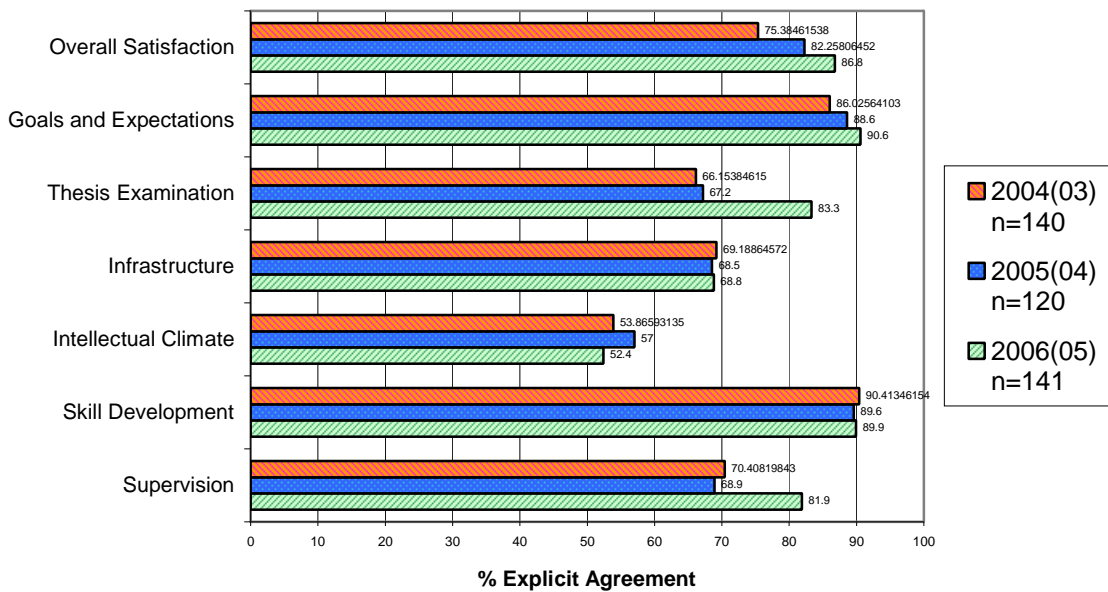


Since 2003 the University has turned increased attention to HDR student satisfaction surveys. In particular it has introduced a new survey of newly-started students completing their first full year of enrolment. This was introduced to monitor the University's Central and Divisional Commencement Programs. In addition to this the University is now more closely monitoring the DEST Postgraduate Research Exit Questionnaire (PREQ) process. Over the period 2004 – 2006 the University's performance has improved significantly in four of the seven PREQ criteria – see Chart 13. The largest increases have occurred with the "Overall Satisfaction" and "Supervision" criteria, the latter being particularly pleasing (given the increased investment in supervision and supervisory practice by the University).

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Chart 13

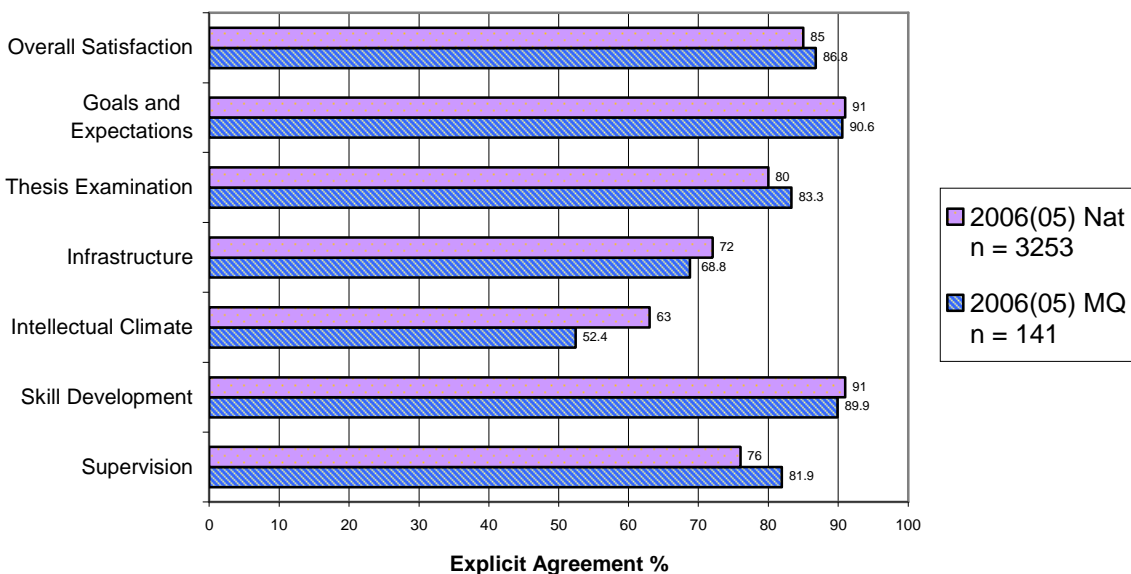
PREQ Scale Averages Macquarie University 2003 - 2005 Graduates



The University’s performance under PREQ has also improved in comparison with the National average – see Chart 14. Improvements are apparent in three of the seven criteria, which leads us to believe the increases shown in Chart 13 are real. It is paradoxical that improvement in almost all ratings is offset by a decrease in the rating for “Intellectual Climate”. The reasons for this are the subject of ongoing evaluation – one initiative being a survey of HDR student opinion at the end of their first year of candidature.

Chart 14

PREQ Scale Averages - Macquarie University v National 2005 Graduates



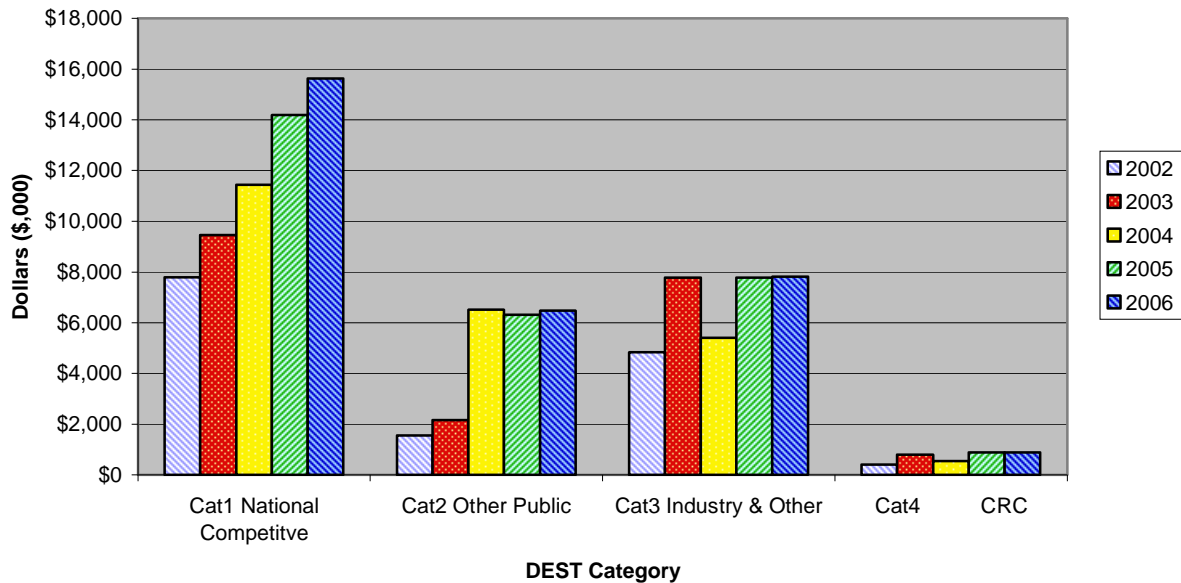
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Research Income

The University's (external) research income profile, shown below (Chart 15), generally reflects our focus on pure basic and strategic basic research, as there is a comparatively strong dependence on Australian Competitive Grants, particularly ARC grants, but as demonstrated by the historical data, non-ACG funding has grown over the period and now represents more than 50% of the total.

Chart 15

Macquarie - HERDC-Reportable Research Income 2002 - 2006

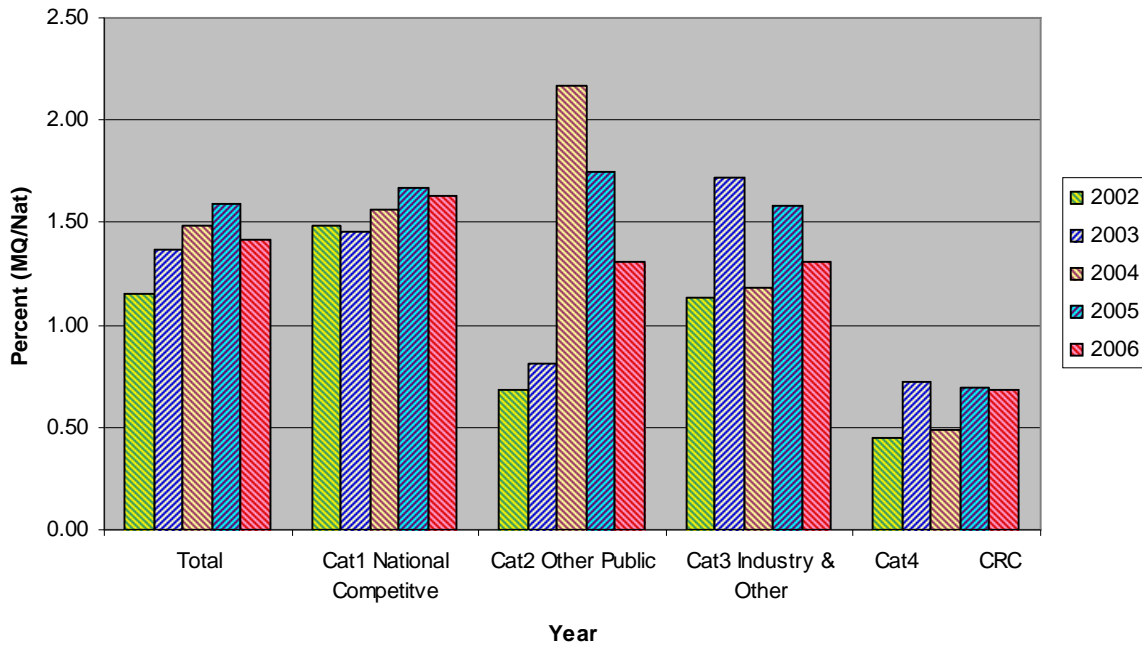


In comparative terms Macquarie's share of total National research income (as measured by HERDC statistics) the general increases shown for 2002 – 2005 have levelled in 2006 (see Chart 16). We believe this to be partly due to the continuing huge increases in medical research funding (largely unavailable to the University), and partly to our inability to compete with Go8 universities for large industry funding (Medicine / Engineering / Agriculture). The noticeable dip in 2006 for the University's comparative HERDC research income performance is explained in terms of a major change in the HERDC funding rules. In 2006 universities were allowed to report joint venture capital investments. In 2006 Go8 reported income *increased* by an amount which was an order of magnitude greater than Macquarie's *total* reported income. So, the dip is an artefact of reporting rather than a real change in performance.

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Chart 16

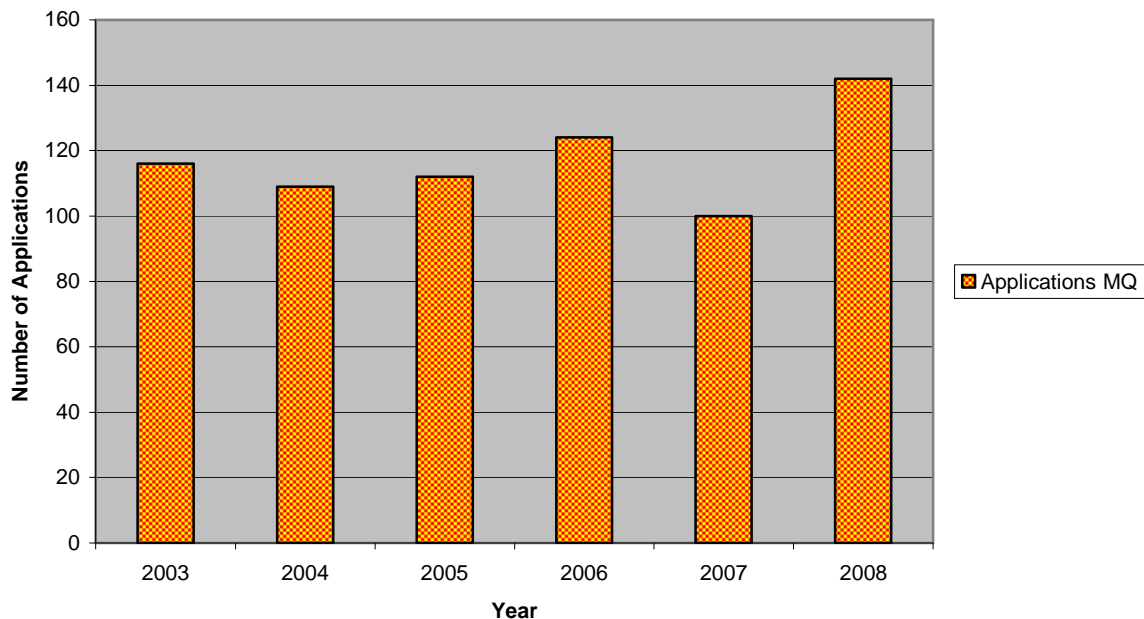
MQ/National (%) HERDC Research Income, by Category



In terms of ARC Discovery-Projects (ARCDP) grant applications, in line with National trends Macquarie has, in general over the period 2003 – 2008, increased the number of applications submitted each year (Chart 17). The slight dip in the chart for 2007 represented an attempt by the University to increase the quality of those applications that were submitted. This was in response to concerns made by the Australian Research Council over the number of applications it was being required to process each year.

Chart 17

ARC DP Scheme Macquarie Applications 2003 - 2008

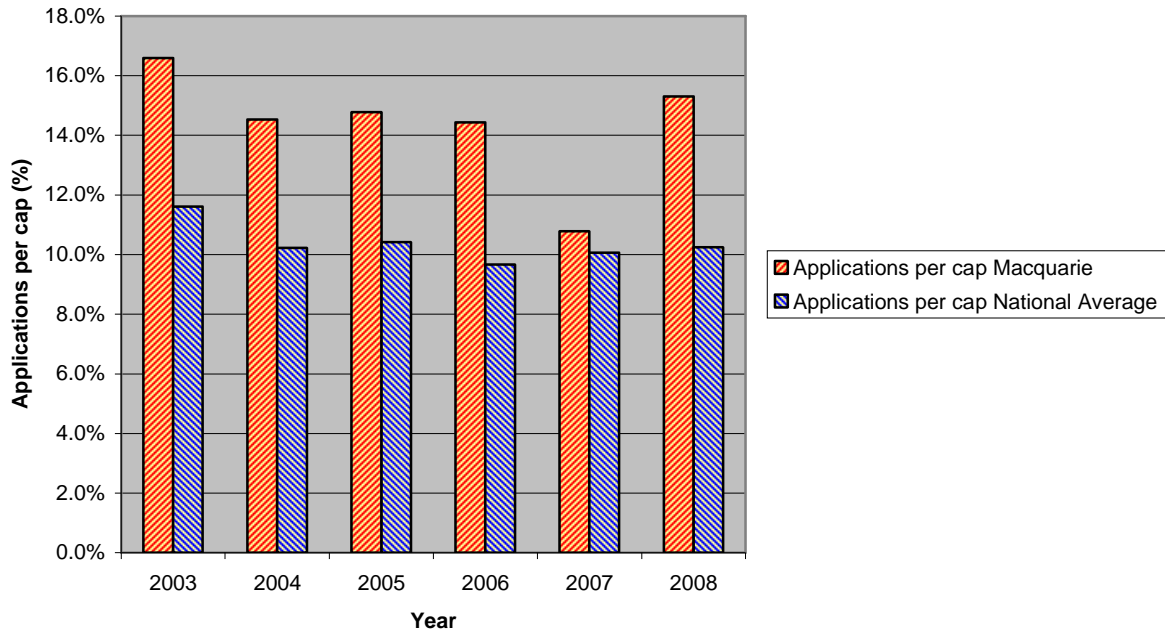


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This phenomenon is perhaps better demonstrated by analysing Macquarie's performance on a per capita basis against National average (Chart 18).

Chart 18

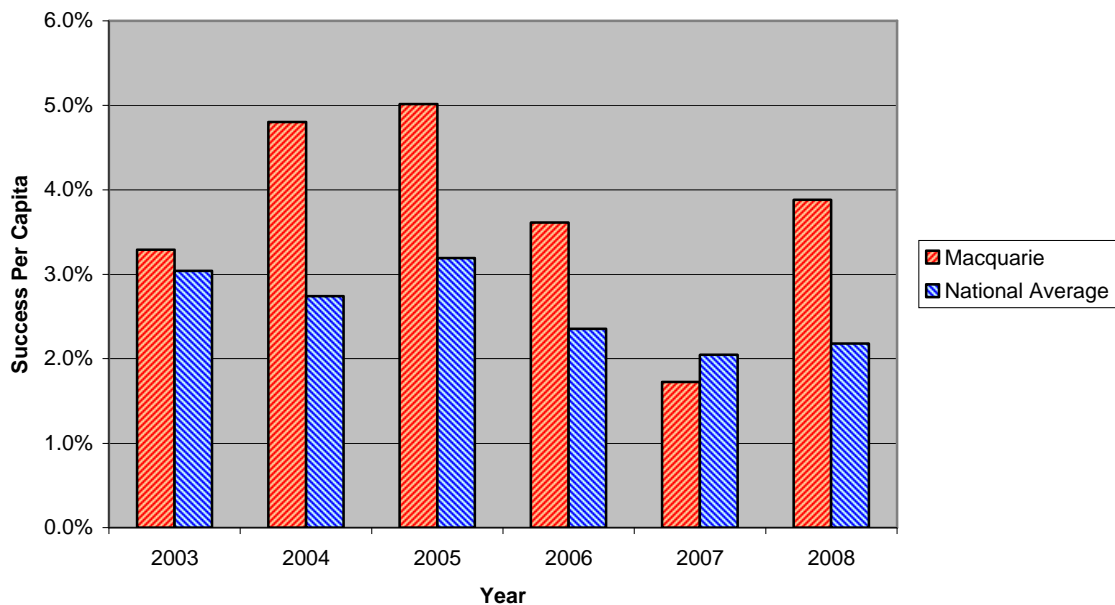
ARC DP Scheme Applications Per Capita - Macquarie vs National Average, 2003 - 2008



In terms of success rates per capita, except for 2007 Macquarie has performed well above the national average (Chart 19). The increased number of applications in 2008 resulted in increased grants, restoring Macquarie's performance to its former average.

Chart 19

ARC DP Scheme - Success Rates Per Capita, Macquarie vs. National Average, 2003 - 2008

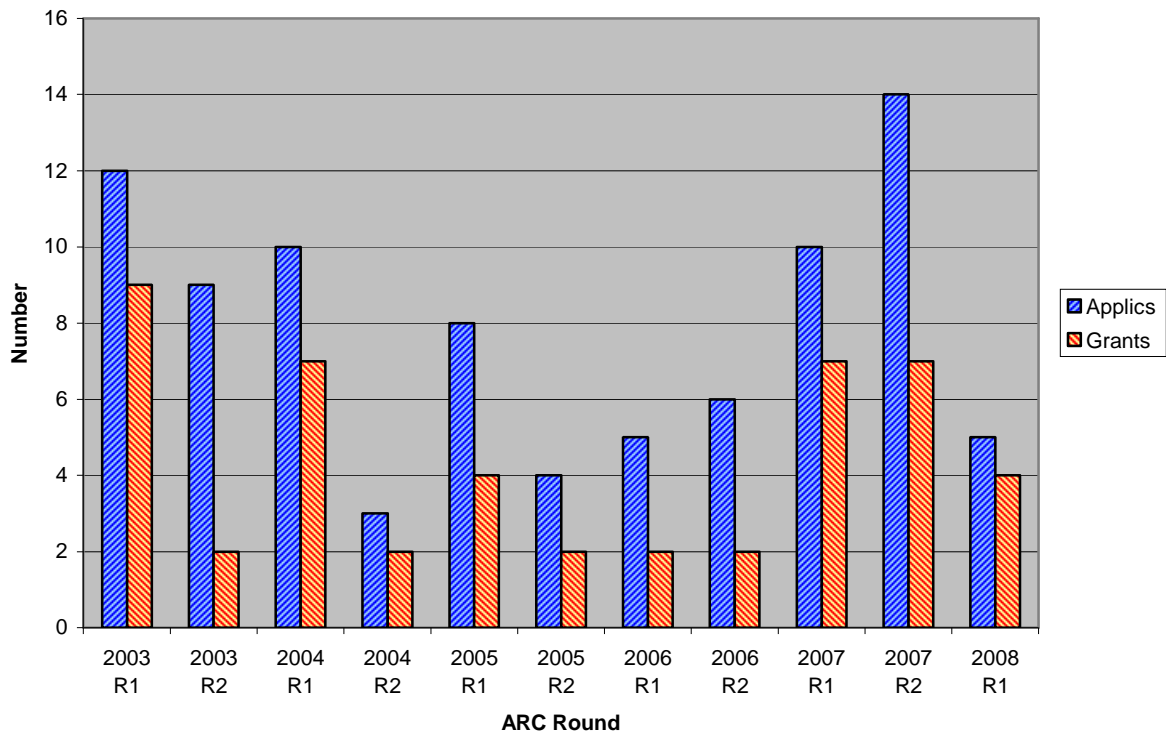


ARC Linkage (Industry Collaboration)

Since 2001 the ARC has operated two rounds of their ARC Linkage-Projects Scheme each year. In terms of the number of applications submitted (and therefore the number of grants awarded), Macquarie University has not performed as well under this Scheme as with the Discovery-Projects Scheme. Relatively small numbers of applications have been submitted by the University each round. The number of applications has varied between three and fourteen applications per round – see Chart 20.

Chart 20

ARC Linkage-Projects Scheme 2003 - 2008, Macquarie Number of Applications and Grants

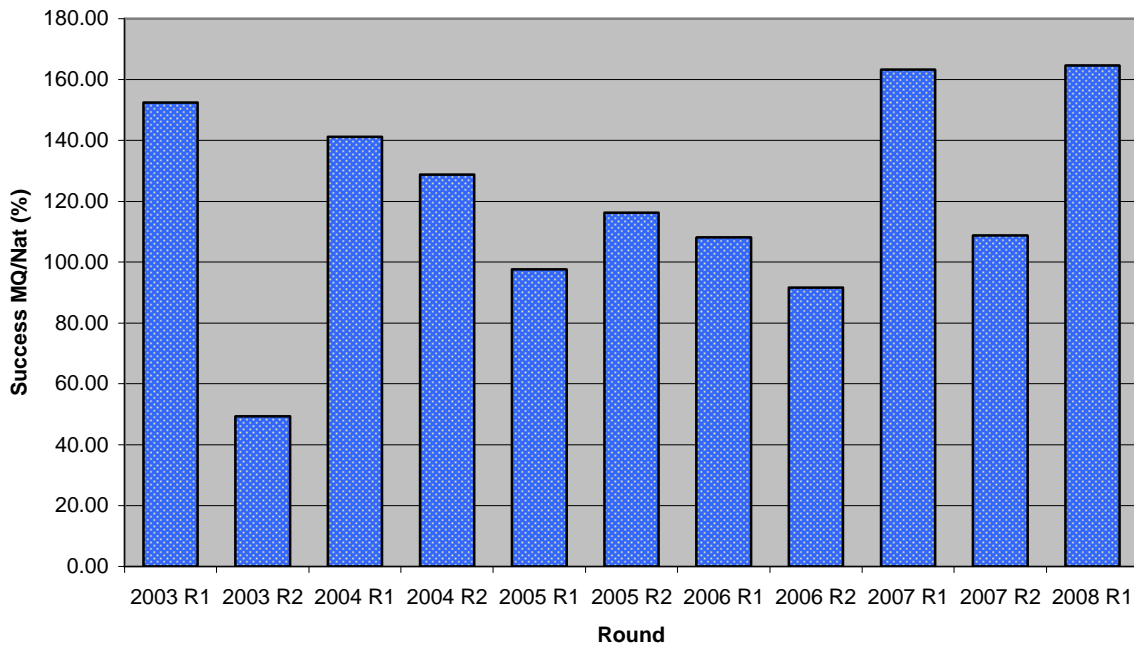


Despite the relatively low numbers of applications, Macquarie’s actual performance is above the National average, as can be seen in Chart 21, which shows the relative success rate (Macquarie versus National average).

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Chart 21

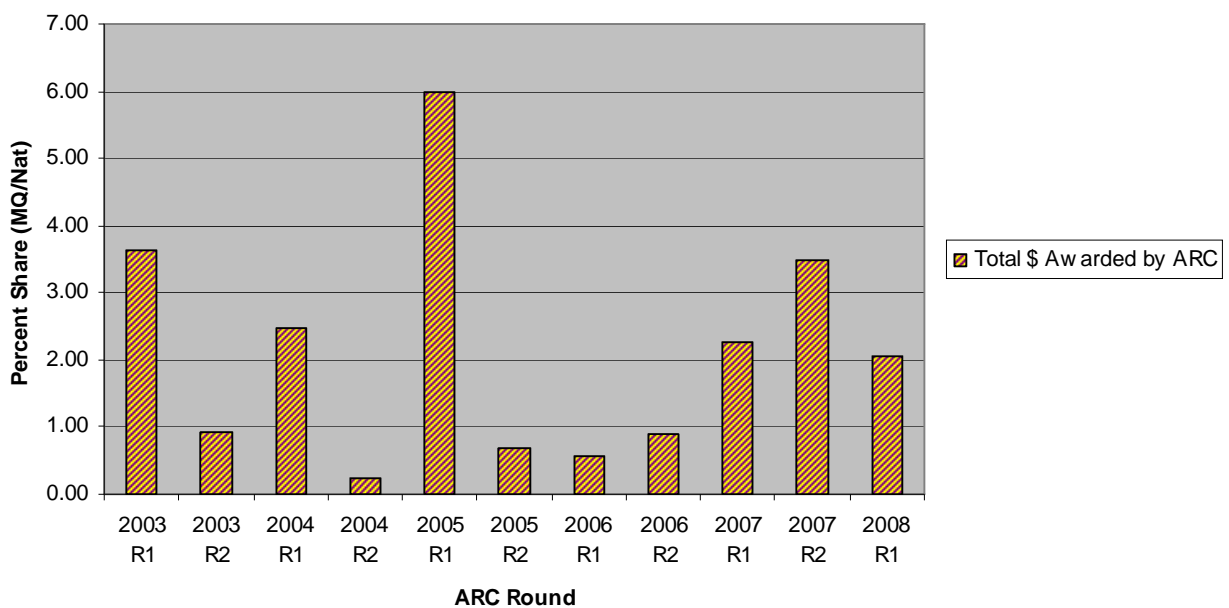
ARC Linkage-Projects Grants Scheme - Success Rates by Round, Macquarie vs National



Charts 20 and 21 both deal with numbers of ARC L-P applications. In dollar terms Macquarie's share of grants is quite "lumpy" (Chart 22). But the fact that in three of the eleven rounds shown Macquarie has gained more than 3% of the National total indicates that Macquarie *can* perform above its weight under the right circumstances.

Chart 22

ARC Linkage-Projects Scheme 2003 - 2008, Total Dollars Awarded by ARC, Macquarie/National (Percent)

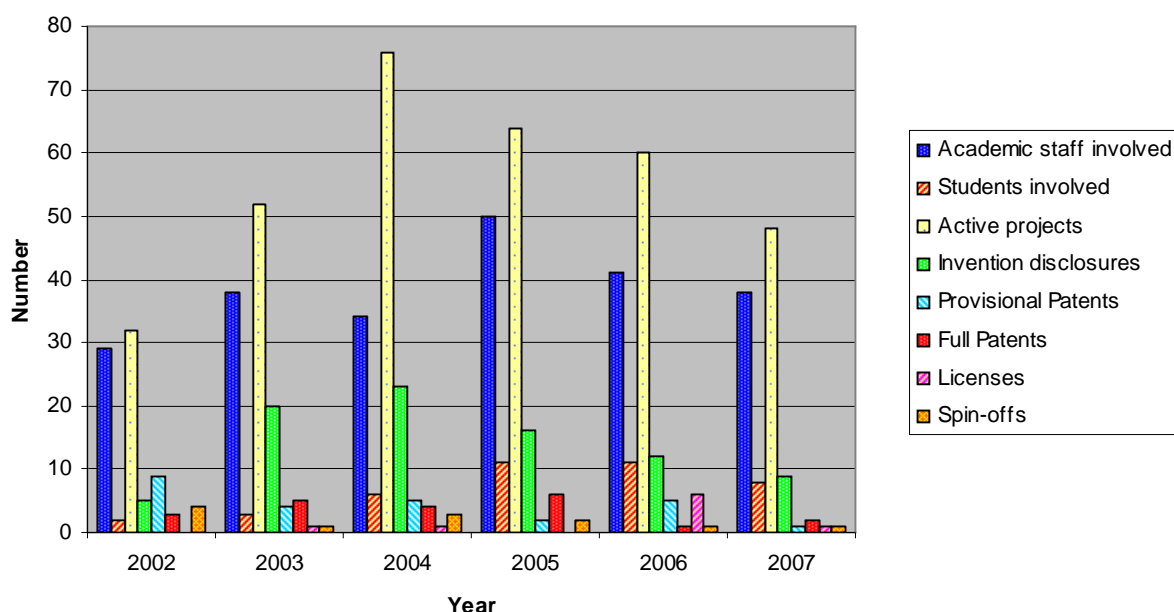


Commercialisation of Research

The University works closely with its commercial arm (the controlled entity Access MQ – formerly Macquarie Research Limited) to commercially exploit its intellectual property. To this end the University’s Intellectual Property and Commercialisation Management Committee meets regularly to monitor development of IP projects from invention disclosures to spin-off companies. An indication of activity in this area from 2002 – 2007 is shown in Chart 23.

Chart 23

Macquarie Commercialisation of Research Activities 2002 - 2007



It is interesting that activity appears to have peaked in 2004. We believe the peak occurred for two reasons. First, commercialisation as a formally organised activity hardly existed at the University before 2002. The increase in “active projects” 2002 - 2004 represents the University catching up with a backlog of eligible projects over that period. The “apparent decline” since 2005 represents effective management of eligible projects by the University’s Intellectual Property and Commercialisation Management Committee (IPCMC), established in 2004.

Secondly, the “decline” might support a trend reported by other members of the Australian HE sector. The explanation usually given for this decline is the increasing pressure upon researchers to publish their work, not only for the purposes of promotion, but also increasing pressure upon universities to have their performance measured in terms of output. In addition, the proposed Research Quality Framework may also have had a significant effect in stressing publication output as a key performance indicator. The resulting priority given to Publications over Invention Disclosures means that a university’s opportunity to protect potentially commercialisable intellectual property is being lost.

Over the period shown (2002 – 2007) the University has established twelve “start-up” companies (an average of almost 1.5 per year). Only one of these has since failed, and that because of the unusual way it was structured. Note that the twelve does not include the University’s most spectacular success – the electronics spin-off Radiata,

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the microchip company which was sold to CISCO Systems for several hundred thousand dollars. Currently the most successful start-up company is Bluglass Limited which is worth \$16 million on the Australian Stock Exchange. Over recent years the University has instituted an effective commercialization process in collaboration with its Commercial Arm, AccessMQ. In early 2008 a significant review of commercialisation structures and processes is being undertaken by the Deputy Vice-Chancellor (Research).

In 2007 the University opened an Incubator on campus. Since its opening the Incubator has attracted six tenants. The Incubator is designed to provide low cost accommodation for development of innovation and potentially commercialisable opportunities.

Other Recent Developments in Research and Research Training

Research Active Staff

In 2006 as part of development of the University's new Research Strategic Plan, a definition of "research active" was developed. The definition is divided into two parts – the first being based on metrics and applicable under all circumstances, and the second a set of criteria requiring subjective judgement applicable mainly for internal purposes (appointments, promotions, OSP, etc). The two sections of this definition are reproduced below

Research Activity Indicators

The University's Research Activity indicators are:

- (a) Maintaining a minimum average rate of one authored or co-authored publication (defined as publications under the DEST categories A1, B1, C1 and selected quality E1, H, I and J1) per year over the past 6 years **or** one authored research monograph (A1) and three other DEST publications from the above categories over the past 6 years.

Exceptions to this requirement are: Staff recently engaging in research, early career researchers, and staff who have a break in their research career (e.g. maternity leave). For these staff the research activity indicator is a minimum average rate of one authored or co-authored publication (defined as publications under the DEST categories A1, B1, C1 and selected quality E1, H, I and J1) per year (in the case of staff recently engaging in research this indicator applies from 2005).

and:

- (b) Demonstrated capacity to translate research outcomes into teaching and learning in the University by way of current Higher Degree Research student supervision, or other measures approved by the Dean of Division including but not restricted to:
- Higher Degree Research student supervision leading to a completion in the past two years;

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- other participation over the past two years in research training, including coursework and Honours programs with research training or preparation components;
- current satisfactory progression towards completion of a Research Higher Degree;
- delivering professional education and training; or
- delivering community service and enterprise.

These Research Activity Indicators have already been put to practical use both in the RQF Trial undertaken in 2007 (for defining eligibility of participants), and in the University's normal internal processes for assessing staff in promotions, applications for sabbatical leave, etc.

Research Quality Framework

It is noteworthy that part (a) of this definition was used to select participants for the major Research Quality Framework Trial undertaken in 2007 in collaboration with the University of Newcastle. In this Trial, eligible researchers produced individual Quality Portfolios, which were then assessed by panels of external assessors. About 40% of these assessors were from overseas institutions – assessors from the UK with RAE assessment experience were particularly targeted. The Trial was fully electronic, with all portfolios and assessments transmitted digitally.

For the purposes of the Trial the University developed a definitive set of Esteem Factors. These Factors were derived from an internet search of international practice, especially in the UK (because of the UK's experience with the use of such factors in their Research Assessment Exercises. A table of the University's Esteem Factors can be found at http://www.research.mq.edu.au/policy/documents/RQF_Esteem_Factors_8.pdf .

The results of the Trial have given the two Universities an excellent understanding of their current research strengths, as well as areas needing further development. The Trial not only has established an international benchmark for the Universities' research, but also enables the monitoring of future improvements in research performance. It has also highlighted the complementary research strengths of the two Institutions.

The Trial has also helped the two Universities prepare their academic and support staff for next year's RQF Proper by providing useful feedback to individuals and informing the process of forming Research Groupings.

Esteem Factors

As indicated above part of the Quality Assessment Trial involved individual Evidence Portfolios submitted by individual staff. Within these Evidence Portfolios, staff were required to list their Esteem Factors. For this purpose, the University defined a set of Esteem Factors, following a review of esteem factors used internationally (but especially within the UK, as used by UK universities for their Research Assessment Exercises). The list of Esteem Factors determined by Macquarie can be found at http://www.research.mq.edu.au/researchers/iris/documents/Peer_Esteem_Factors_RQF_IRIS_list.pdf .