



Australian Government  
Australian Research Council

CONSULTATION PAPER

# Consultation

RESEARCH in the national interest - enabling the future

Excellence in Research for Australia (ERA) Initiative

June 2008

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## MINISTER'S FOREWORD



Excellence in Research for Australia (ERA) honours the Australian government's promise to create a better research quality assurance system. ERA will be streamlined, transparent, internationally verifiable, cost-effective, and based on quality measures appropriate to each discipline. It will compare Australian researchers not just with each other, but with the best in the world.

We have moved quickly to launch ERA because university researchers are critical to the national innovation system. No one doubts the contribution they make to our economy, society and culture. ERA will enable us to measure their achievements.

The government wants to craft a system that has the support of researchers and universities. The Australian Research Council has prepared this consultation paper to stimulate and focus discussion. The more feedback we get, the better ERA will be. Please take this opportunity to have your say.

A handwritten signature in black ink that reads "Kim Carr". The signature is written in a cursive style and is underlined with a single horizontal line.

**Senator the Hon. Kim Carr**  
**Minister for Innovation, Industry, Science and Research**

## CEO'S FOREWORD



On behalf of the Australian Research Council (ARC), I am pleased to release the Excellence in Research for Australia (ERA) Consultation Paper.

The Commonwealth invests billions of dollars each year in research. The ERA process will provide evidence of Australia's research strengths and where there are opportunities for development. Minister Carr has emphasised the importance of developing a new system that is streamlined, transparent and workable, measures our achievements against our peers around the world, and assists in planning future research investment in Australia.

I am proud that the ARC has carriage of this most important project on behalf of the Australian Government. The ARC is working closely with the National Health and Medical Research Council and in consultation with the Department of Innovation, Industry, Science and Research to deliver this first stage of the ERA initiative.

There are a range of issues that we are seeking feedback on but in particular I would like to draw your attention to two issues that are crucial to the shape and utility of ERA:

1. attribution of publications and other indicators of research excellence; and
2. options for institutions in assigning reporting codes (i.e., FoRs and other codes) and the associated workload for these options.

This Consultation Paper is the first formal step in communicating with the sector and requests feedback from the higher education and research community. I look forward to your contribution to this consultation process and your help to ensure that ERA will identify the strengths in Australia's higher education sector and has the confidence of the sector it will assess.

A handwritten signature in black ink, which appears to read 'Margaret Sheil'. The signature is fluid and cursive, written in a professional style.

Professor Margaret Sheil  
CEO ARC

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## 1. INTRODUCTION

The Excellence in Research for Australia (ERA) initiative is being developed by the Australian Research Council (ARC) in consultation with the National Health and Medical Research Council (NHMRC) and with advice from the Department of Innovation, Industry, Science and Research (DIISR).

ERA reflects the Government's commitment to a transparent, streamlined, approach for evaluation of the excellence of research undertaken in Australia's universities, using readily available information where practical.

The new framework aims to:

- identify excellence across the full spectrum of research activity;
- compare Australia's university research effort against international benchmarks;
- create incentives to improve the quality of research; and
- identify emerging research areas and opportunities for further development.

ERA should command the confidence of the research community and, in particular, recognise on-going imperatives to:

- promote collaboration between institutions and between university researchers and end users;
- encourage scale and focus and thereby efficient use of research infrastructure and resources;
- facilitate interdisciplinary research; and
- minimise the burden on individual researchers, institutions and expert assessors.

ERA will undertake evaluations of the research in Australian higher education institutions in each of eight discipline clusters. Original research is defined as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. This could include synthesis and analysis of previous research to the extent that it is new and creative. This definition of research is drawn from the OECD definition and is used for the *Higher Education Research Data Collection Specifications*.

The first stage of evaluations will assess research excellence using a combination of indicators and expert review by committees comprising experienced, internationally-recognised experts. These evaluations will be informed by three broad categories of indicators:

- measures of research activity and intensity;
- indicators of research quality; and
- indicators of excellent applied research and translation of research outcomes.

It is expected that some indicators will be applicable to all disciplines while some will be discipline-specific. The identification of these indicators will be considered by the ERA Indicators Development Group and will be finalised following consultation with the sector using a range of different forums.

ERA will not determine the allocation of research block grants. The Higher Education Research Data Collection (HERDC) process managed by DIISR will continue to inform research block grant allocations until such a time that the Government considers and implements any new mechanism.

In the longer term, ERA will provide a framework that gives government, industry, business and the wider community, assurance of the quality of research in Australia's higher education institutions and guide future investment in that research effort.

This paper outlines the framework for ERA, the proposed timetable, and seeks views from the sector and other relevant stakeholders on specific issues.

## 2. PROPOSED APPROACH

ERA will evaluate research undertaken in higher education institutions using measures of research activity and intensity; indicators of research quality; and indicators of excellent applied research and translation of research outcomes. Evaluations will be by discipline and by institution (eligible organisations are listed in [Appendix A](#)).

Evaluations will take place in the following discipline clusters:

- Physical, Chemical and Earth Sciences (PCE);
- Humanities and Creative Arts (HCA);
- Engineering and Environmental Sciences (EE);
- Social, Behavioural and Economic Sciences (SBE);
- Mathematics, Information and Communication Sciences (MIC);
- Biological Sciences and Biotechnology (BSB);
- Biomedical and Clinical Research (BCR); and
- Public and Allied Health and Health Services (PAHHS).

Each evaluation will take place over a period of three to four months (from submission to evaluation) and will be overseen by a Research Assessment Committee (RAC). Each RAC will include internationally-recognised researchers with expertise in research evaluation together with current and former members of the ARC College of Experts and NHMRC assessment panels.

The evaluations will commence with PCE followed by HCA. The timing for the remainder of the clusters will be determined after this first stage. Indicators for disciplines will be trialled, although the extent of consultation required for different disciplines will vary. ERA will assess all research undertaken during specified reference periods. There is scope for different reference periods to be used for different classes of indicators to ensure that the data collected is as current as possible and to reduce the associated workload.

### Unit of Evaluation

The unit of evaluation for ERA will be research disciplines within an institution, classified by the Australian and New Zealand Standard Research Classification (ANZSRC) Field of Research (FoR) codes at both two-digit (22 Divisions) and four-digit (157 Groups) level where relevant. By way of examples, two-digit divisions are Physical Sciences or Economics and four-digit groups are Optical Physics and Econometrics (see [section 8](#) for cluster/discipline assignment).

ERA will assess *all* research produced by each discipline cluster within an institution during the reference period(s); however, it is intended that ERA will report at both the two-digit and four-digit levels, rather than at the aggregated cluster level. There is also scope to use other methods for reporting of the outcomes (see [section 6](#)).

### Interdisciplinary Research

Interdisciplinary research should not be disadvantaged in ERA. Submission of interdisciplinary research will be permitted to more than one cluster where relevant. This will enable a more accurate view of all research contributing to each cluster. The approach to evaluation will be designed to ensure that relevant expertise will be available to assist with the evaluation of interdisciplinary work.

The submitting institution will be required to identify interdisciplinary research which will be submitted to more than one cluster for evaluation.

## **Cross-Institutional Research**

It is also important that ERA encourages collaboration across institutions. As with interdisciplinary research it is important that cross-institutional outputs can be submitted by each institution provided that these are appropriately identified.

### **Indicators**

The indicators and proxies developed for ERA will be appropriate to each discipline. The Indicators Development Group, in consultation with the sector, will develop and test appropriate indicators and other proxies for each discipline cluster (see [section 3](#) for more information about the Indicators Development Group).

ERA will use three categories of indicators:

1. *Research activity and intensity*  
Measures of research activity include research income, Higher Degree by Research (HDR) student load and completions and staff Full-Time Equivalent (FTE) data tagged to two-digit FoR codes. HDR load and completions are incorporated in the measures of research activity/intensity only as they are not of themselves a measure of research quality.
2. *Research quality*  
Indicators of research quality include publications analysis (ranked outlets, citation analysis and percentile analysis where relevant) and research income awarded on the basis of peer review. ERA will require publication data tagged to four-digit FoR codes.
3. *Applied research and translation of research outcomes*  
Developing indicators of excellent applied research and translation of research outcomes is a complex task. Advice will be sought from each cluster of disciplines on which indicators are best included here. For example, there may be scope for disaggregating income and some of the publication indicators to use as indicators of external recognition of excellent applied research.

Where the Indicators Development Group agrees that there are no appropriate indicators for the discipline, or information about the outputs is not captured by the indicators being used for the discipline (e.g., the majority of research outputs are not indexed by the citation data supplier), then peer review of a sample of outputs may be required (see also [section 5](#)).

### **Measures of Research Activity and Intensity**

Both the level of activity and productivity of each discipline are important considerations when evaluating overall research performance. Information would therefore be required on the following:

- staff FTE data;
- research income (Categories 1-5, see [page 9](#));
- HDR student load (by type);
- HDR student completions (by type); and
- other discipline-specific measures of research activity and intensity as identified by the Indicators Development Group and via the consultation process.

For the first clusters to be evaluated, research activity and intensity data will be collected at two-digit FoR level (as outlined below, indicators of research quality will be collected at four-digit level). In order to produce an intensity measure, ERA will require staff FTE to be submitted by two-digit FoR code for each year of the reference period used for collection of indicators of activity and intensity, noting this may be different to the publications reference period (more below).

1. *For the 2008 clusters of ERA, research activity and intensity data will be collected at the two-digit FoR level. Collecting this data at four-digit FoR level over the longer term would provide greater granularity of analysis and reporting. We welcome feedback on any implications that this requirement will have for the span of the reference period in terms of retrospective data collection.*
2. *We recognise that non-salaried staff (honorary and adjunct) often contribute to the overall research effort of an institution. Therefore, we are seeking comments on the extent (if any) to which these researchers should be incorporated into staff FTE reporting.*

### **Indicators of Research Quality**

ERA will consider a number of indicators of research quality, with a particular focus on research publications and bibliometrics, including:

- profile of publications across the four bands of ranked journals, publishers, conferences, etc., over the reference period, where relevant and available;
- profile of citations against relevant Australian and world benchmarks where relevant and available;
- centile analysis of publications against most highly cited world papers where relevant;
- peer reviewed research income; and
- other discipline-specific indicators of research quality as identified by the Indicators Development Group and/or through the consultation process.

All research quality indicators will be collected at four-digit FoR.

3. *Are there other core indicators of research quality that could readily be included?*

### **Indicators of Success in Applied Research and Translation of Research Outcomes**

With the exception of some research income categories, it is expected that most indicators of success in relation to applied research and translation of research outcomes will be specific to each discipline (or cluster of disciplines). Some examples include:

- research income awarded in collaboration with end users;
- licence income and other commercialisation revenue;
- exhibitions and/or performances;
- publications/presentations in practitioner-focussed outlets;
- patents;
- plant breeders' rights; and
- other discipline-specific measures of success and/or uptake in applied research.

For the 2008 clusters of ERA, applied research and translation of research outcomes indicators will be required at the two-digit FoR level.

4. *What other discipline-specific measures of excellence in applied research and translation of research outcomes should be considered by the Indicators Development Group, and how should they be benchmarked?*
5. *We would welcome suggestions regarding types of practitioner-focussed outlets that may indicate excellence in applied research or translation.*

### 3. INDICATORS: SPECIFIC CONSIDERATIONS

#### Research Income Data

ERA will use research income to produce measures of research activity. ERA will use the existing categories for reporting research income in the HERDC. In addition, ERA may collect research income where it is awarded to institutions by the Australia Council and other relevant non-HERDC income identified during consultation.

Research income will be collected according to the following HERDC categories:

- Category 1 – Australian Competitive Grants;
- Category 2 – Other Public Sector Research Income;
- Category 3 – Industry and Other Research Income;
- Category 4 – Cooperative Research Centre Research Income; and
- Category 5 – Relevant non-HERDC research income, for example, Australia Council awards to individuals.

Category 1 research income will be reported at the four-digit FoR level (as currently required by the ARC and NHMRC).

From 2007, institutions are required to disaggregate Category 3 research income into two sub-categories: international competitive, peer-reviewed income; and other income. It is not expected this disaggregation can be incorporated into the first ERA cycle, however, as the data becomes available it is expected that it could be included in future evaluations.

While research income will be considered by RACs on a rolling basis, it is proposed that the ARC will audit ERA submissions against available data to prevent double counting of income.

As a broad indicator of success that is independent of the cost of research in different disciplines, it may also be useful for institutions to submit information on the number of grants awarded in some categories.

For Clusters 7 and 8, institutions will be required to split research income between the two clusters based on the discipline focus of each cluster (as Medical and Health Sciences is a single two-digit FoR which spans both clusters).

The consultation process may identify income streams that universities can report (at four-digit and two-digit FoR) and further consultation will determine how they are used for each cluster evaluation. Refer to the indicators examples in [section 6](#) for how research income indicators might be compiled and presented to RACs.

6. *How feasible is it to collect category 2-4 research income data at four-digit FoR? Are there specific issues for each category for retrospective collection? Are there specific issues for future collections in Category 3?*
7. *Are all the income categories necessary or appropriate? What additional income streams could be collected under Category 5?*
8. *What would the most useful research income reference period be for ERA, considering this does not need to be the same as the six-year publications reference period (see [page 10](#))?*
9. *How practical is it to request numbers of successful grants in addition to research income?*

## Research Publications Data

ERA will consider all publications within a publications reference period for the following publication types:

- book;
- book chapter;
- journal article; and
- refereed conference publication.

The above are the HERDC categories that have been used by institutions for reporting to the Government and provide coverage of a significant proportion of the research publications produced in Australian higher education institutions.

The institution will be required to submit a unique identifier for each publication indexed in the citation database(s) during the reference period. These unique identifiers allow citation data to be quickly and accurately obtained from the relevant database supplier.

We expect additional publication types will be identified for some disciplines during the consultation process.

10. *A list of other possible publications types is provided in [Appendix B](#). We are seeking feedback on whether there is support for these types to be included for individual disciplines and whether these categories are appropriately identified.*

## Publication Reference Period(s)

ERA will evaluate publications by analysing all research publications and other outputs produced by a discipline for each institution over the publication reference period that will be six years ending on 31 December two years prior to the evaluation year. For example, the publication reference period for research evaluated in 2009 would be from 1 January 2002 to 31 December 2007. For research evaluated in 2010 the publication reference period would be from 1 January 2003 to 31 December 2008.

A six-year period will ensure sufficient time for publications to be indexed by the citation data supplier and for citations to build to an acceptable level for the final year in the reference period. A six-year period will also provide for the equitable treatment of publications in successive ERA rounds regardless of whether these were to be held at any of two, three, or six year intervals. This would provide for maximum flexibility for determining the frequency of future ERA evaluations.

It is feasible that indicators of research income and research training could be collected over a shorter reference period, perhaps three years. A shorter period would reduce the workload associated with the exercise and mean all the non-publication indicators have greater currency.

11. *Should all non-publication data be collected over a shorter reference period? If so, what would that period be?*

## Attribution

There are two broad approaches to attributing publications to institutions for ERA. Publications could either be attributed to the researcher who is attached to an institution as at a specified census date. Alternatively, publications could be attributed to the institution named on the publication.

It is proposed that irrespective of the decision on publications, all other indicators will be collected based on institution affiliation because attributing research income and other indicators to staff who have moved would be difficult to monitor and verify.

In the case of publication indicators, the ARC Advisory Council has indicated that it prefers an approach that attributes publications based on a researcher's affiliation as at a specified census date.

#### *Approach 1 – staff affiliation at census date*

Using an approach based on the location of researchers as at a specified census date, publication indicators would be attributed to researchers based on where the researcher is presently working, not necessarily where the research had been undertaken. .

The advantage of this approach is that it would provide for a more recent snapshot of an institution's performance and therefore be more useful in guiding possible decisions relating to future investments in research rather than relying on institution affiliation at the time of publication.

The disadvantage of this approach is that it may require more effort for institutions depending on the extent to which the information has already been collected (or can be easily obtained) from researchers.

#### *Approach 2 – institution affiliation based on HERDC*

Using an approach based on institution affiliation (i.e., in line with HERDC), indicators would be attributed to the institution in which the activity occurred during the reference period. This approach would take advantage of existing research data collection processes within institutions.

The advantage of this approach is that it would be possible to verify that a publication has an institution affiliation listed (since in the majority of cases it will be identified on the publication itself).

The disadvantage of this approach is that it would not necessarily reflect the current state of affairs of an institution. It would also not reflect the anticipated performance of the institution going forward.

**12. Please provide comment on the above approaches for attributing publications.**

### **Outlet Rankings**

It is anticipated that all disciplines will use some form of ranked outlets analysis. The rankings will be one of a suite of indicators that will be used on a discipline-specific basis to evaluate research.

Research outlets will be ranked into four tiers on the basis of the overall quality that each has for a particular discipline. The distribution of the tiers is expected to vary slightly across disciplines, however, it will approximate: Tier A\* (top 5%); Tier A (next 15%); Tier B (next 30%); and Tier C (bottom 50%). Examples of research outlet types that may be ranked include journals, publishers, conferences and venues.

A journal ranking index is currently being developed, and the list will be finalised in consultation with the sector. More than 17,000 journals have been ranked across 100 disciplines. This is a larger number of journals than either the Thomson ISI or Scopus index use in their respective databases which contain approximately 15,000 indexed journals.

The Learned Academies and other discipline peak bodies were asked to rank only those journals that are *core* to each discipline (e.g., psychologists were asked not to rank journals in which they might publish from time to time but could not be fairly considered as core journals to the psychology discipline).

The ARC will release the draft journal ranking list for sector consultation in June 2008. Additional discipline-specific outlets will be identified through consultation. The lists will then be refined, finalised and published. It is worth noting that journals of Australian origin are well represented in the top tiers of the draft rankings.

## Citations

The discipline-specific journal rankings will also be used to derive journal sets from which discipline-specific citation benchmarks will be generated. This is a necessity since the discipline journal sets (sometimes referred to as “subject category”) used by both Thomson ISI and Scopus are very broad, often covering several FoR codes, with up to 30 per cent overlap with other journal sets. Such a situation can significantly skew centile analysis when disciplines with different citation practices are included in a single journal set (this was revealed to the ARC in a trial citations count undertaken using data from two Australian universities). By using journal sets that are more narrowly focused on discipline-specific citation practices, more accurate international benchmarks can be obtained.

### *Citations Per Publication*

The ARC will analyse the relevant journal articles (or equivalent) from each discipline, obtaining total publication and citation counts for each institution and calculate a citation per publication rate for each. The ARC will provide this data in summary form to RACs, together with relevant international and national benchmark data for each discipline within the cluster under evaluation.

Refer to the indicators examples section on [page 15](#) for how research publication indicators might be compiled and presented to RACs.

## Indicators Development Group

The ARC will convene an Indicators Development Group to consider, test (through a variety of means including consultation) and recommend appropriate discipline-specific indicators.

The group will be supported by an analytical support team which will test a variety of methodologies to ensure the best possible indicators for each discipline.

## Data Suppliers

The ARC will test the use of multiple citation data suppliers to determine the most appropriate supplier for each discipline. It is hoped this will provide improved coverage for disciplines where citation analysis has previously been unreliable.

13. *Which citation data suppliers in your experience result in the most meaningful citation analysis for each of the disciplines?*

## Research Training

ERA will collect data on HDR student load and completions at the two-digit FoR for each year of the reference period. HDR student load will be submitted based on degree type (e.g., Masters and PhD) and FoR.

For Clusters 7 and 8, it is expected that institutions will be required to split HDR load and completions data between the two clusters based on the discipline focus of each cluster (as Medical and Health Sciences is a single two-digit FoR which spans both clusters).

It is possible to tag research outputs that include HDR students as authors to enable analysis of both the volume and quality of such outputs.

The approach would require institutions to identify those publications which include HDR students as authors, which would then allow the ARC to undertake data analysis and generate a separate profile for consideration by RACs.

14. *Please provide comments regarding research training indicators. Is it possible to provide HDR completions data retrospectively at the four-digit FoR level?*
15. *Do you see value in tagging research outputs as authored by HDR students and value in the analyses this will produce?*

#### **4. SUBMISSION**

The precise details of the submission process will depend on the approach adopted for attribution of publications and non-publication indicators as well as the feedback received with respect to indicators and reporting codes. An outline of the proposed data collection requirements and reference periods is provided in [Appendix C](#).

Each institution could be invited to provide a brief outline of any relevant background to the performance and development of the disciplines under consideration.

Further consultation will take place during 2008 regarding additional details of the submission process. Much work has been undertaken to date in relation to the design of institutional research management systems and the ARC intends to take this into account in the development of the submission guidelines.

16. *Institutions are invited to comment on the ease or otherwise of meeting any of the data requirements outlined in this document in addition to the specific questions addressed under particular headings.*

#### **5. EVALUATION**

The precise details of the evaluation process will depend on the approach adopted for attribution of publications and non-publication indicators along with other feedback on the proposed ERA approach. It is expected that following institutions' submission of data for ERA, the ARC will be responsible for bibliometric and other analyses employed.

The methodology for these analyses will be transparent and made available to the sector prior to each cluster evaluation. Additionally, each RAC will be guided by published evaluation guidelines and will develop a set of discipline-specific national and international benchmarks for each of the different indicators types.

In considering the profiles and other information available to them, the RACs will determine a profile of research excellence for the cluster, detailing the proportion of research that meets these benchmarks. Each RAC will also determine indicators that can be used to identify emerging areas.

When a cluster is being evaluated, the evaluation of interdisciplinary research may require a RAC to co-opt relevant expertise from the membership of other RACs.

The extent to which each discipline and sub-discipline is ascribed to a profile will be determined by the RACs. Profiles will not be generated by numerically combining individual indicators and where possible the final reports will detail as much information as possible to show the basis for those determinations (see also examples in [section 6](#)).

## Peer Review and Expert Evaluation

It is accepted that peer review will have already occurred on a significant majority of publications and is already a condition of a publication being considered as one of the four major publication types collected for the HERDC (i.e., book, book chapter, journal article, conference publication). Similarly, it is straightforward to identify competitive grant income that has been awarded on the basis of peer review and is therefore reported as Category 1 research income for HERDC. Consequently, any peer or expert review invoked under ERA will be designed to avoid any unnecessary duplication of that effort.

The main source of expert evaluation for ERA will be conducted by the RACs which will consider the range of indicators and other supporting information specifically relating to each discipline submitted by an institution. Each RAC will comprise leading national and international experts who will be well placed to consider the range of disciplines within a cluster being evaluated.

Where the Indicators Development Group agrees that there are no appropriate indicators for the discipline, or information about the output(s) is not captured by the indicators being used for the discipline (e.g., the majority of research outputs are not indexed by the citation data supplier), then peer review of a sample of outputs may be required.

## 6. REPORTING

### Consolidation and Reporting of Outcomes

The information for each discipline will be consolidated into a publicly available report that details indicators and the criteria used to establish benchmarks. It will consequently allow for comparisons of different characteristics or traits of research in different disciplines and institutions as well as a comparison of the excellence of different disciplines with each other.

A possible way in which this information could be presented is in a “report card” format (showing the profile of the performance of each institution by discipline). For example:

*Example - Institutional Publication Report Card*

	Discipline			
	Institution W	Institution X	Institution Y	Institution Z
International	10%	40%	35%	45%
National	20%	25%	20%	20%
Emerging	30%	15%	10%	10%
Not Competitive	40%	20%	35%	25%

There is also some scope to present this information as part of a “national scorecard”, comparing the performance outcomes of different disciplines across all institutions against specific benchmarks. An example of this is presented below:

*Example - National Scorecard Publications*

Discipline	Chemical Sciences	Earth Sciences	Physical Sciences
International	60%	25%	45%
National	20%	15%	25%
Emerging	10%	25%	15%
Not Competitive	10%	35%	15%

## **Institution-specific Reporting Codes**

Using disciplines as the basis of evaluation means that the simplest method of reporting outcomes is by discipline of the research, not the discipline of the researcher. Often there will be no distinction between the two. However, there will be cases where there is not the same alignment, for example, a physicist who works in aerospace engineering may have his/her work reflected in a different discipline.

Many institutions have moved away from traditional disciplines either in their academic organisational structures or at least in the way in which research centres, strengths or priority areas have been identified and promoted.

For reporting purposes there may be considerable advantages in being able to report the outcomes in other ways. These could be via the research unit (institution-designated research strength or priority area, research centre or group) and/or academic units (faculties, schools or departments) especially where the latter is the method of research student enrolment. Having an additional dimension of reporting may be particularly desirable when the research assessed crosses traditional departmental, discipline or institutional boundaries.

To allow for flexibility in reporting outcomes, in addition to the discipline alignment of the research, it is therefore proposed that ERA also collect information about the area within the institution where the research is done. This would require institutions to assign one or more additional reporting codes to each output in addition to the ANZSRC codes.

ERA could then report at the cluster, discipline, institution levels and against reporting codes level, making it easy to analyse data to maximise use and impact by the Government and by institutions, including:

- discipline level (two and four-digit FoR) – to identify areas of national research strength;
- institution – comparing research strengths across institutions; and
- academic unit – providing reporting flexibility for institutions.

*17. We propose there is considerable value in having maximum flexibility and utility with respect to reporting, however, we also recognise the workload involved for institutions in assigning reporting codes. We welcome feedback on this issue in respect to both the feasibility and value of such an approach.*

## **Examples of Indicators**

### *Research Income*

Research income could be broken down to show how a discipline is performing on a yearly basis. Research income data will be analysed by the following types and compared with discipline benchmarks:

- research income type;
- number of grants;
- total dollar value;
- dollars per grant; and
- research income per FTE.

Other indicators could include an institution's share of the total funding for all institutions for that particular discipline.

### *Outlet Ranking*

An example of the application of outlet rankings would occur where University of X submits 350 journal publications for evaluation in the Macromolecular and Materials Chemistry discipline, as part of the PCE Discipline Cluster. Bibliometrics are applied to the submitted publications. The agreed bibliometrics for the discipline are journal rankings and citations.

For this discipline the Indicators Development Group has recommended that rankings only exist for journals. The discipline therefore uses the final ERA outlet ranking list (developed in consultation with researchers in the sector) with respect to journals.

The institution's publications data is cross-referenced to the ranking list and the following breakdown of the number of articles published in journals in each ranked tier is produced:

<b>Tier</b>	<b>Number</b>	<b>Percentage</b>
A*	82	23%
A	105	30%
B	104	30%
C	46	13%
Not Ranked	13	4%
<b>Total</b>	<b>350</b>	<b>100%</b>

### *Citations per publication*

Of the institution's 350 submitted publications, 337 are indexed by the database supplier. These produce the following results for the entire evaluation period:

*Citation per publication analysis (cpp) – Average Citations for University of X: Macromolecular and Materials Chemistry*

<b>Total Publications</b>	<b>Sum of cites</b>	<b>Institution cpp</b>	<b>World cpp Average</b>	<b>Australian cpp Average</b>
337	2871	8.52	5.08	4.53
<b>Relative citations against world and Australian average</b>			1.67	1.88

### *Centile Distribution of the Discipline's Publications*

The ARC will analyse the relevant journal articles (or equivalent) from the discipline and obtain a distribution of all articles across centile bands. This will show the number and proportion of each institution's publications for a particular discipline that are judged to be among the top 1 per cent, 5 per cent, 10 per cent, 20 per cent and 50 per cent most highly cited publications for that discipline in any given year.

### *Centile Analysis*

These tables show the number of the institution's publications that are in the top 1 per cent, 5 per cent, 10 per cent, etc., of articles internationally.

*Number and distribution of publications for University of X:  
Macromolecular and Materials Chemistry*

	<1%	2-5%	6-10%	11-20%	21-50%	>50%	Total
<b>Number</b>	13	35	25	38	111	115	337
<b>Percentage</b>	4%	11%	7%	11%	33%	34%	100%

*Research Training*

The University's performance against research training will initially rely on two indicators – HDR load and completions by discipline. This data will be used with FTE to calculate a research training intensity ratio which can be used for comparison.

The University's HDR load and completions (for Masters and PhD students) for the Chemical Sciences over the evaluation period is:

<b>Research Training</b>					
<b>Institution:</b>		University of X			
<b>Discipline Cluster:</b>		PCE			
<b>Discipline:</b>		Chemical Sciences			
<b>Year</b>	<b>Masters Load (FTE)</b>	<b>Masters Completions</b>	<b>PhD Load (FTE)</b>	<b>PhD Completions</b>	<b>Staff FTE</b>
Total	148	97	54	32	48.7
per FTE	3.0	2.0	1.1	0.7	

It may also be possible to develop an indicator for HDR students based on the quality of their publications and other outputs. Separate bibliometric analyses could be performed on publications solely or co-authored by students. However, the feasibility of this approach depends on whether institutions hold the information about student authorship (e.g., for previous HERDC collections). We therefore welcome feedback.

18. *Institutions are invited to comment on the feasibility or otherwise of institutions identifying student authorship in previous HERDC collections.*

## 7. CONSULTATION PLAN 2008

The identification and development of appropriate indicators will commence with the release of the ERA Consultation Paper and establishment of the Indicators Development Group. Consultation for the 2008 clusters will commence in July and continue throughout 2008 using a range of different forums.

<b>Date</b>	<b>Event</b>
<b>May 2008</b>	ERA Consultation Paper released
<b>June 2008</b>	Draft ranked outlets list released to sector for comment
<b>July 2008</b>	Indicators Development Group commences Cluster One consultation begins Cluster Two consultation begins
<b>August 2008</b>	Draft ERA Submission Guidelines released to the sector for comment
<b>September 2008</b>	Cluster One consultation ends
<b>October 2008</b>	Cluster Two consultation ends

## 8. PROPOSED CLUSTER STRUCTURE AND MEMBERSHIP

ERA evaluations will be undertaken by the RACs by discipline cluster. RACs will include experienced internationally-recognised researchers with expertise in research evaluation. External expertise will be used to analyse the indicators including, where available, comparing them to international benchmarks. Membership of the RACs may be drawn from current and previous members of the ARC and NHMRC panels.

Outlined below is a proposed summary of the disciplines covered by each discipline cluster based on the 2008 ANZSRC. This summary also outlines the proposed sequence of cluster evaluations.

<b>DISCIPLINE CLUSTER 1</b>	<b>DISCIPLINE</b>	<b>FoR</b>
<b>PHYSICAL, CHEMICAL AND EARTH SCIENCES</b>	ASTRONOMICAL AND SPACE SCIENCES	0201
	ATOMIC, MOLECULAR, NUCLEAR, PARTICLE AND PLASMA PHYSICS	0202
	CLASSICAL PHYSICS	0203
	CONDENSED MATTER PHYSICS	0204
	OPTICAL PHYSICS	0205
	QUANTUM PHYSICS	0206
	OTHER PHYSICAL SCIENCES	0299
	MATHEMATICAL PHYSICS	0105
	PHYSICAL CHEMISTRY (INCL. STRUCTURAL)	0306
	INORGANIC CHEMISTRY	0302
	ORGANIC CHEMISTRY	0305
	ANALYTICAL CHEMISTRY	0301
	MACROMOLECULAR AND MATERIALS CHEMISTRY	0303
	THEORETICAL AND COMPUTATIONAL CHEMISTRY	0307
	MEDICINAL AND BIOMOLECULAR CHEMISTRY	0304
	OTHER CHEMICAL SCIENCES	0399
	GEOLOGY	0403
	GEOFYSICS	0404
	GEOCHEMISTRY	0402
	OCEANOGRAPHY	0405
PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE	0406	
ATMOSPHERIC SCIENCES	0401	
OTHER EARTH SCIENCES	0499	

<b>DISCIPLINE CLUSTER 2</b>	<b>DISCIPLINE</b>	<b>FoR</b>
<b>HUMANITIES AND CREATIVE ARTS</b>	PERFORMING ARTS AND CREATIVE WRITING	1904
	VISUAL ARTS AND CRAFTS	1905
	FILM, TELEVISION AND DIGITAL MEDIA	1902
	JOURNALISM AND PROFESSIONAL WRITING	1903
	ART THEORY AND CRITICISM	1901
	OTHER STUDIES IN CREATIVE ARTS AND WRITING	1999
	LANGUAGE STUDIES	2003
	LITERARY STUDIES	2005
	LINGUISTICS	2004
	CULTURAL STUDIES	2002
	COMMUNICATION AND MEDIA STUDIES	2001
	OTHER LANGUAGE, COMMUNICATION AND CULTURE	2099
	HISTORICAL STUDIES	2103
	ARCHAEOLOGY	2101
	CURATORIAL AND RELATED STUDIES	2102
	OTHER HISTORY AND ARCHAEOLOGY	2199
	PHILOSOPHY	2203
	APPLIED ETHICS	2201
	RELIGION AND RELIGIOUS TRADITIONS	2204
	HISTORY AND PHILOSOPHY OF SPECIFIC FIELDS	2202
	OTHER PHILOSOPHY AND RELIGIOUS STUDIES	2299
	LAW	1801
	OTHER LAW AND LEGAL STUDIES	1899
	ARCHITECTURE	1201
	URBAN AND REGIONAL PLANNING	1205
	DESIGN PRACTICE AND MANAGEMENT	1203
	OTHER BUILT ENVIRONMENT AND DESIGN	1299
LIBRARY AND INFORMATION STUDIES	0807	
OTHER STUDIES IN HUMAN SOCIETY	1699	

<b>DISCIPLINE CLUSTER 3</b>	<b>DISCIPLINE</b>	<b>FoR</b>
<b>ENGINEERING AND ENVIRONMENTAL SCIENCES</b>	SOIL SCIENCES	0503
	ENVIRONMENTAL SCIENCE AND MANAGEMENT	0502
	ECOLOGICAL APPLICATIONS	0501
	OTHER ENVIRONMENTAL SCIENCES	0599
	AEROSPACE ENGINEERING	0901
	MANUFACTURING ENGINEERING	0910
	AUTOMOTIVE ENGINEERING	0902
	MECHANICAL ENGINEERING	0913
	CHEMICAL ENGINEERING	0904
	RESOURCES ENGINEERING AND EXTRACTIVE METALLURGY	0914
	CIVIL ENGINEERING	0905
	GEOMATIC ENGINEERING	0909
	ENVIRONMENTAL ENGINEERING	0907
	MARITIME ENGINEERING	0911
	MATERIALS ENGINEERING	0912
	BIOMEDICAL ENGINEERING	0903
	INDUSTRIAL BIOTECHNOLOGY	1003
	NANOTECHNOLOGY	1007
	BUILDING	1202
ENGINEERING DESIGN	1204	

<b>DISCIPLINE CLUSTER 4</b>	<b>DISCIPLINE</b>	<b>FoR</b>
<b>SOCIAL, BEHAVIOURAL AND ECONOMIC SCIENCES</b>	ACCOUNTING, AUDITING AND ACCOUNTABILITY	1501
	BANKING, FINANCE AND INVESTMENT	1502
	BUSINESS AND MANAGEMENT	1503
	MARKETING	1504
	SERVICES	1505
	TOURISM	1506
	TRANSPORTATION AND FREIGHT SERVICES	1507
	OTHER COMMERCE, MANAGEMENT, TOURISM AND SERVICES	1599
	ECONOMIC THEORY	1401
	APPLIED ECONOMICS	1402
	ECONOMETRICS	1403
	OTHER ECONOMICS	1499
	SOCIOLOGY	1608
	SOCIAL WORK	1607
	ANTHROPOLOGY	1601
	HUMAN GEOGRAPHY	1604
	DEMOGRAPHY	1603
	POLITICAL SCIENCE	1606
	POLICY AND ADMINISTRATION	1605
	CRIMINOLOGY	1602
	PSYCHOLOGY	1701
	COGNITIVE SCIENCE	1702
	OTHER PSYCHOLOGY AND COGNITIVE SCIENCES	1799
	EDUCATION SYSTEMS	1301
CURRICULUM AND PEDAGOGY	1302	
SPECIALIST STUDIES IN EDUCATION	1303	
OTHER EDUCATION	1399	

<b>DISCIPLINE CLUSTER 5</b>	<b>DISCIPLINE</b>	<b>FoR</b>
<b>MATHEMATICS, INFORMATION AND COMMUNICATION SCIENCES</b>	COMPUTER HARDWARE	1006
	COMMUNICATIONS TECHNOLOGIES	1005
	OTHER TECHNOLOGY	1099
	PURE MATHEMATICS	0101
	APPLIED MATHEMATICS	0102
	NUMERICAL AND COMPUTATIONAL MATHEMATICS	0103
	STATISTICS	0104
	OTHER MATHEMATICAL SCIENCES	0199
	INFORMATION SYSTEMS	0806
	ARTIFICIAL INTELLIGENCE AND IMAGE PROCESSING	0801
	COMPUTER SOFTWARE	0803
	COMPUTATION THEORY AND MATHEMATICS	0802
	DATA FORMAT	0804
	DISTRIBUTED COMPUTING	0805
	OTHER INFORMATION AND COMPUTING SCIENCES	0899
	ELECTRICAL AND ELECTRONIC ENGINEERING	0906

<b>DISCIPLINE CLUSTER 6</b>	<b>DISCIPLINE</b>	<b>FoR</b>
<b>BIOLOGICAL SCIENCES AND BIOTECHNOLOGY</b>	BIOCHEMISTRY AND CELL BIOLOGY	0601
	GENETICS	0604
	MICROBIOLOGY	0605
	PLANT BIOLOGY	0607
	ZOOLOGY	0608
	PHYSIOLOGY	0606
	ECOLOGY	0602
	EVOLUTIONARY BIOLOGY	0603
	OTHER BIOLOGICAL SCIENCES	0699
	CROP AND PASTURE PRODUCTION	0703
	HORTICULTURAL PRODUCTION	0706
	ANIMAL PRODUCTION	0702
	VETERINARY SCIENCES	0707
	FORESTRY SCIENCES	0705
	FISHERIES SCIENCES	0704
	AGRICULTURE, LAND AND PARKS MANAGEMENT	0701
	OTHER AGRICULTURAL AND VETERINARY SCIENCES	0799
FOOD SCIENCES	0908	
AGRICULTURAL BIOTECHNOLOGY	1001	
ENVIRONMENTAL BIOTECHNOLOGY	1002	

<b>DISCIPLINE CLUSTER 7</b>	<b>DISCIPLINE</b>	<b>FoR</b>
<b>BIOMEDICAL AND CLINICAL RESEARCH</b>	IMMUNOLOGY	1107
	MEDICAL BIOCHEMISTRY AND METABOLOMICS	1101
	MEDICAL MICROBIOLOGY	1108
	PHARMACOLOGY AND PHARMACEUTICAL SCIENCES	1115
	MEDICAL PHYSIOLOGY	1116
	NEUROSCIENCES	1109
	DENTISTRY	1105
	OPTOMETRY AND OPHTHALMOLOGY	1113
	CLINICAL SCIENCES	1103
	PAEDIATRICS AND REPRODUCTIVE MEDICINE	1114
	CARDIOVASCULAR MEDICINE AND HAEMATOLOGY	1102
	ONCOLOGY AND CARCINOGENESIS	1112
MEDICAL BIOTECHNOLOGY	1004	

<b>DISCIPLINE CLUSTER 8</b>	<b>DISCIPLINE</b>	<b>FoR</b>
<b>PUBLIC AND ALLIED HEALTH AND HEALTH SCIENCES</b>	NURSING	1110
	PUBLIC HEALTH AND HEALTH SERVICES	1117
	NUTRITION AND DIETETICS	1111
	COMPLEMENTARY AND ALTERNATIVE MEDICINE	1104
	HUMAN MOVEMENT AND SPORTS SCIENCE	1106
	OTHER MEDICAL AND HEALTH SCIENCES	1199

## 9. SUBMISSIONS IN RESPONSE TO THE ERA CONSULTATION PAPER

The ARC is inviting submissions in response to the ERA Consultation Paper.

You are invited to forward your comments and suggestions to the issues raised in this Consultation Paper by **COB 30 June 2008**.

The pro-forma for submission responses can be found on the ARC website:

<http://www.arc.gov.au/era/consultation.htm>

**Email** submissions can be sent to [era@arc.gov.au](mailto:era@arc.gov.au)

**Fax** submissions can be sent to **(02) 6287 6601**.

A signed hard copy of the submission should also be sent to:

**The Submissions Officer  
Research Excellence Branch  
Australian Research Council  
GPO Box 2702  
CANBERRA ACT 2601**

## APPENDIX A

Eligible institutions are Table A and Table B providers, as defined in the *Higher Education Support Act 2003 (HESA)*. This includes all campuses of an institution in Australia and overseas.

### *Eligible Organisations*

Australian Catholic University  
Batchelor Institute of Indigenous Tertiary Education  
Bond University  
Central Queensland University  
Charles Darwin University  
Charles Sturt University  
Curtin University of Technology  
Deakin University  
Edith Cowan University  
Flinders University  
Griffith University  
James Cook University  
La Trobe University  
Macquarie University  
Melbourne College of Divinity  
Monash University  
Murdoch University  
Queensland University of Technology  
RMIT University  
Southern Cross University  
Swinburne University of Technology  
The Australian National University  
The University of Adelaide  
The University of Melbourne  
The University of New England  
The University of New South Wales  
The University of Newcastle  
The University of Notre Dame Australia  
The University of Queensland  
The University of Sydney  
The University of the Sunshine Coast  
The University of Western Australia  
University of Ballarat  
University of Canberra  
University of South Australia  
University of Southern Queensland  
University of Tasmania (incorporating Australian Maritime College)  
University of Technology, Sydney  
University of Western Sydney  
University of Wollongong  
Victoria University

## **APPENDIX B**

### *List of Publication Types*

Book - Authored Research  
Book - Authored other  
Book - Edited  
Book - Revision or New Edition  
Book Chapter - In Research Books  
Book Chapter - Non-Commercial Publisher  
Journal Article - Refereed, Scholarly Journal  
Journal Article - Other Contribution to Scholarly Reviewed Journal  
Journal Article - Non-Refereed Article  
Journal Article - Letter or Note  
Reviews  
Conference Publication - Full Paper Refereed  
Conference Publication - Full Paper Non-Refereed  
Conference Publication - Extract of Paper  
Edited Volume of Conference Proceedings  
Audio-Visual Recordings  
Computer Software  
Computer Databases  
Technical Drawing, Design or Working Model (refereed designs)  
Design Exhibitions  
Design Awards  
Patents  
Exhibition, Written or Recorded Work (major original creative works)  
Other Exhibitions of Original Art  
Representations of Original Art  
Recorded Major Original Creative Work  
Research Report - Commissioned by Government, Industry or Other  
Technical Report  
Legal Case  
Dictionary/Encyclopedia Entry  
Textbook  
Map  
Newspaper or Magazine Article  
Translation  
New Media Output

A draft revised version of this list will be released for consultation during 2008.

## APPENDIX C

### Summary of Indicators

	FoR level	Reference period
<b>Measures of research activity and intensity</b>		
Staff FTE data	two-digit	3 years
Research income		
Category 1	four-digit	3 years
Category 2	two-digit	3 years
Category 3	two-digit	3 years
Category 4	two-digit	3 years
Category 5	two-digit	3 years
HDR student load (by type)	two-digit	3 years
HDR student completions (by type)	two-digit	3 years
Other discipline-specific measures of research activity and intensity as identified by the Indicators Development Group	two-digit	3 years

<b>Indicators of research quality</b>		
Profile of publications across the four bands of ranked journals, publishers, conferences, etc., over the reference period, where relevant and available	four-digit	6 years
Profile of citations against relevant Australian and world benchmarks where relevant and available	four-digit	6 years
Centile analysis of publications against most highly cited world papers where relevant	four-digit	6 years
Peer reviewed income	four-digit	6 years
Other discipline-specific indicators of research quality as identified by the Indicators Development Group	four-digit	6 years

<b>Indicators of success in applied research and translation of research outcomes</b>		
Patents produced (by type)	two-digit	3 years
Plant breeders' rights	two-digit	3 years
Licence income and other commercialisation revenues	two-digit	3 years
Research income awarded in collaboration with end users	two-digit	3 years
Attendances at exhibitions and/or performances	two-digit	3 years
Indicators for practitioner-focussed outlets	two-digit	3 years
Other discipline-specific indicators of success in applied research and translation of research outcomes as identified by the Indicators Development Group	two-digit	3 years

NOTE - For Clusters 7 and 8, institutions will be required to split data required at two-digit FoR between the two clusters based on the discipline focus of each cluster (as Medical and Health Sciences is a single two-digit FoR which spans both clusters).

## APPENDIX D

### *List of Abbreviations*

ANZSRC	Australian and New Zealand Standard Research Classification
ARC	Australian Research Council
BCR	Biomedical and Clinical Research
BSB	Biological Sciences and Biotechnology
DIISR	Department of Innovation, Industry, Science and Research
EE	Engineering and Environmental Sciences
ERA	Excellence in Research for Australia
FoR	Field of Research
FTE	Full Time Equivalent
HCA	Humanities and Creative Arts
HDR	Higher Degree by Research
HERDC	Higher Education Research Data Collection
NHMRC	National Health and Medical Research Council
MIC	Mathematics, Information and Communication Sciences
PAHHS	Public and Allied Health and Health Services
PCE	Physical, Chemical and Earth Sciences
RAC	Research Assessment Committee
SBE	Social, Behavioural and Economic Sciences