



Australian Government
Australian Research Council

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Excellence in Research for Australia

University of Tasmania visit

Physical, Chemical and Earth Sciences





Objectives of ERA

1. establish an evaluation framework that gives government, industry, business and the wider community assurance of the excellence of research conducted in Australia's institutions;
2. provide a national stocktake of discipline-level areas of research strength and areas where there is opportunity for development in Australia's higher education institutions;
3. identify excellence across the full spectrum of research performance;
4. identify emerging research areas and opportunities for further development; and
5. allow for comparisons of Australia's research nationally and internationally for all discipline areas.





ERA Documents

- ERA Submission Guidelines
- ERA Evaluation Guidelines
- PCE discipline matrix
- ERA Indicator Principles
- ERA Indicator Benchmark Methodology





ERA Clusters

Cluster 1	Physical, Chemical and Earth Sciences
Cluster 2	Humanities and Creative Arts
Cluster 3	Engineering and Environmental Sciences
Cluster 4	Social, Behavioural and Economic Sciences
Cluster 5	Mathematics, Information and Computing Sciences
Cluster 6	Biological and Biotechnological Sciences
Cluster 7	Biomedical and Clinical Health Research
Cluster 8	Public and Allied Health Sciences



Research Codes



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- RFCDs codes revised by Australian Bureau of Statistics
- Now ANZSRC codes – both grants and ERA

Two digit codes

- Eg., 03 Chemistry

Four digit codes

- eg., 0302 Inorganic Chemistry

Six digit codes

- Eg., 030205 Non metal chemistry





ANZSRC – Two digit codes

- 01 Mathematical Sciences
- 02 Physical Sciences
- 03 Chemical Sciences
- 04 Earth Sciences
- 05 Environmental Sciences
- 06 Biological Sciences
- 07 Agricultural and Veterinary Sciences
- 08 Information and Computing Sciences
- 09 Engineering
- 10 Technology
- 11 Medical and Health Sciences
- 12 Built Environment and Design
- 13 Education
- 14 Economics
- 15 Commerce, Management, Tourism and Services
- 16 Studies in Human Society
- 17 Psychology and Cognitive Sciences
- 18 Law and Legal Studies
- 19 Studies in Creative Arts and Writing
- 20 Language, Communication and Culture
- 21 History and Archaeology
- 22 Philosophy and Religious Studies





PCE Four-digit codes - Physical

DISCIPLINE	FoR
ASTRONOMICAL AND SPACE SCIENCES	0201
ATOMIC, MOLECULAR, NUCLEAR, PARTICLE & PLASMA PHYSICS	0202
CLASSICAL PHYSICS	0203
CONDENSED MATTER PHYSICS	0204
OPTICAL PHYSICS	0205
QUANTUM PHYSICS	0206
OTHER PHYSICAL SCIENCES	0299





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PCE Four-digit codes - Chemical

DISCIPLINE	FoR
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





PCE Four-digit codes - Earth

DISCIPLINE	FoR
GEOLOGY	0403
GEOPHYSICS	0404
GEOCHEMISTRY	0402
OCEANOGRAPHY	0405
PHYSICAL GEOGRAPHY AND ENVIRONMENTAL GEOSCIENCE	0406
ATMOSPHERIC SCIENCES	0401
OTHER EARTH SCIENCES	0499





ERA timeframe

- Trials in 2009 for 2 Clusters only
 - PCE submissions open June and closes July 2009
 - PCE Evaluation in August/September
 - PCE final meeting in early October
 - Outcomes by November 2009
- Full ERA process in 2010 (will include PCE and HCA)





ERA Update - consultation

In 2008:

- ERA Consultation Paper
- Indicators Development Group
- Humanities and Creative Arts Sub Groups
- PCE Working Group
- Visits to overseas countries that have undertaken research evaluations





2009 - Latest focus points for ERA

- Workshops on other six clusters and indigenous and the subsequent plan to release of draft matrices
- Development of esteem indicators
- Ranked refereed conference publications (tiered)
- Finalising the journal rankings lists for other Clusters – expert consultation
- Research Evaluation Committees for PCE and HCA being established



ERA: Lessons learned



- Time needed to adjust thinking to the new approach – even in international context.
- Senior administrators and research offices understand the new approach, researchers are taking some time to get up to speed.
- Workshops held with researchers have shown that once they understand, there is strong level of support for the approach.
- Competing agendas between researchers, research disciplines and university administrators
 - Retrospective data collection challenging
 - Overemphasis on some indicators (e.g. journal rankings) by sector



ERA: Lessons learned (cont.)



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- Esteem indicators are a good example of the tensions the ARC has to deal with but...
 - Researchers tend to favour their inclusion
 - Universities see them as adding unnecessary complexity to the submission process
 - Problems of robustness and making sure they fit the indicator principles
 - Will they add anything to the evaluation process?
 - More to come on esteem





Evaluation – the Unit to be assessed

- What is the ERA Unit of Evaluation?
- What is **not** a Unit of Evaluation?





Level of Evaluation in ERA

Level of evaluation	Comparison
National	Performance against Australian average
2-digit FoR	High-level discipline performance
4-digit FoR*	Detailed discipline performance

* The detail of the six-digit codes is essential when considering the 4-digit FoRs





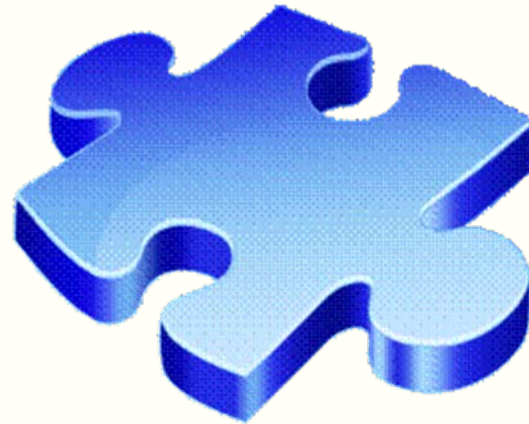
The ERA approach

- Note submission guidelines for guidance on eligibility
- All research outputs must be submitted
- Journal articles are mapped by **journal** FoR assignment
- Non-journal outputs may be assigned to up to 3 FoRs
- Institutions may tag research outputs with two institutional codes and two research theme codes





Overview of evaluation and evaluation processes





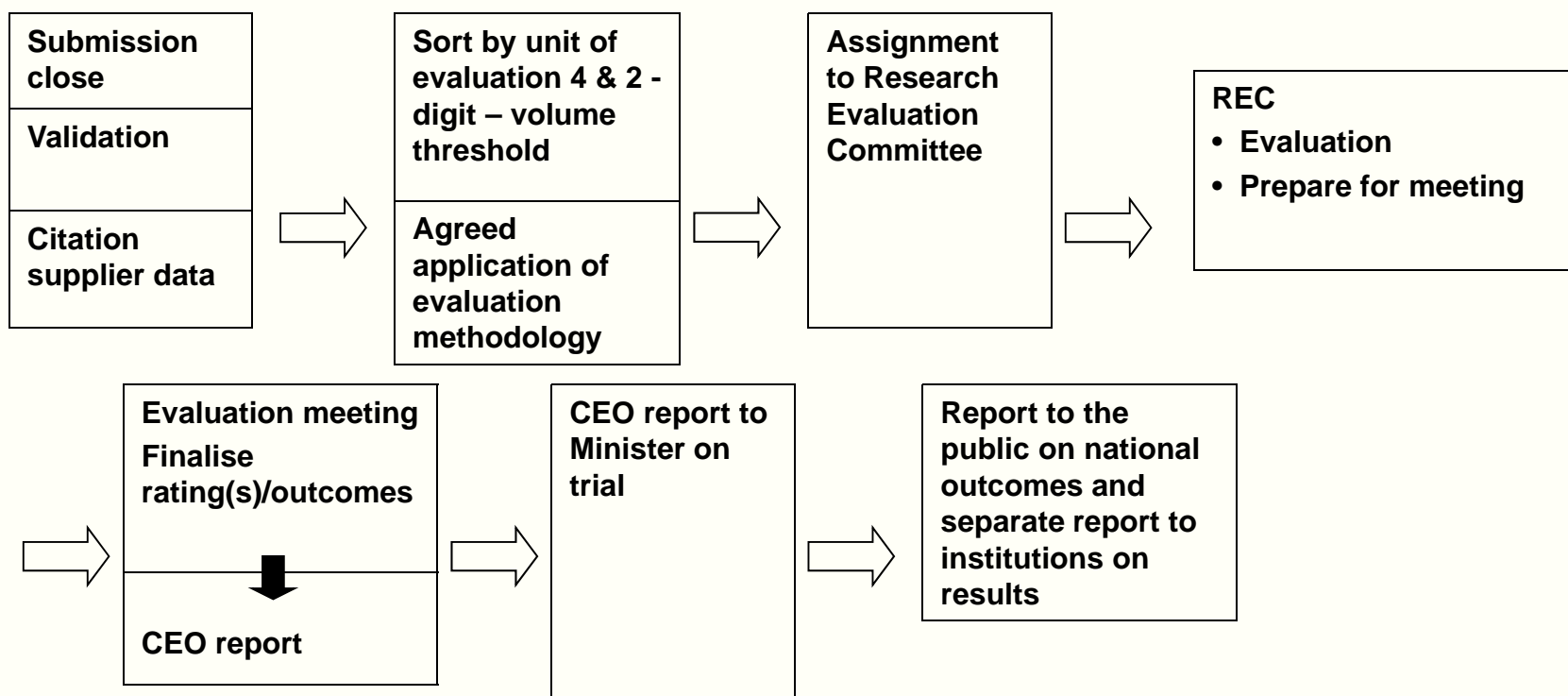
Overview of ERA Evaluation

Key Documents

Submission Guidelines

Indicator Benchmark Methodology

Evaluation Guidelines





The Discipline Matrix

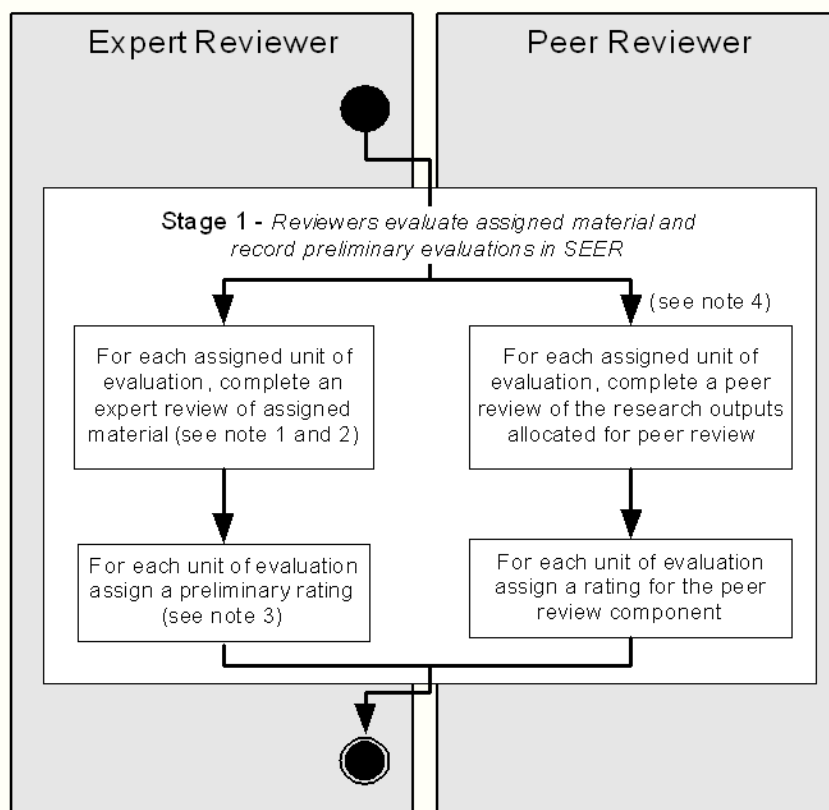
		Volume and Activity Analysis				Ranked outlets		Citation Analysis			Income			
		Eligible researchers profiled by Academic Level	Research Publication outputs by type	Proportion of total publication activity	Proportion of indexed journal articles with international co-authors	Journals	Refereed Conference Publications	Citations per paper against Australian and world Benchmarks	Centile analysis	Distribution of papers against relative citation rate bands	Category 1	Category 2	Category 3 (including sub-categories)	Category 4
02 Physical Sciences														
0201	Astronomical and Space Sciences	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0202	Atomic, Molecular, Nuclear, Particle and Plasma Physics	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0203	Classical Physics	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0204	Condensed Matter Physics	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0205	Optical Physics	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0206	Quantum Physics	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0299	Other Physical Sciences	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
03 Chemical Sciences														
0301	Analytical Chemistry	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0302	Inorganic Chemistry	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0303	Macromolecular and Materials Chemistry	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0304	Medicinal and Biomolecular Chemistry	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0305	Organic Chemistry	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0306	Physical Chemistry (incl. Structural)	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0307	Theoretical and Computational Chemistry	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0399	Other Chemical Sciences	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
04 Earth Sciences														
0401	Atmospheric Sciences	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0402	Geochemistry	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0403	Geology	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0404	Geophysics	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0405	Oceanography	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0406	Physical Geography and Environmental Geoscience	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓
0499	Other Earth Sciences	✓	✓	✓	✓	✓	∞	✓	✓	✓	✓	✓	✓	✓





Three stages to evaluation

- Stage 1- page 20 * No peer review for PCE



Notes:

1. For disciplines where peer review is an indicator, an expert reviewer will normally also perform peer review as part of their review.

2. Assigned material may include ranked journals, citation analysis and other supporting material, for example, research income profiles.

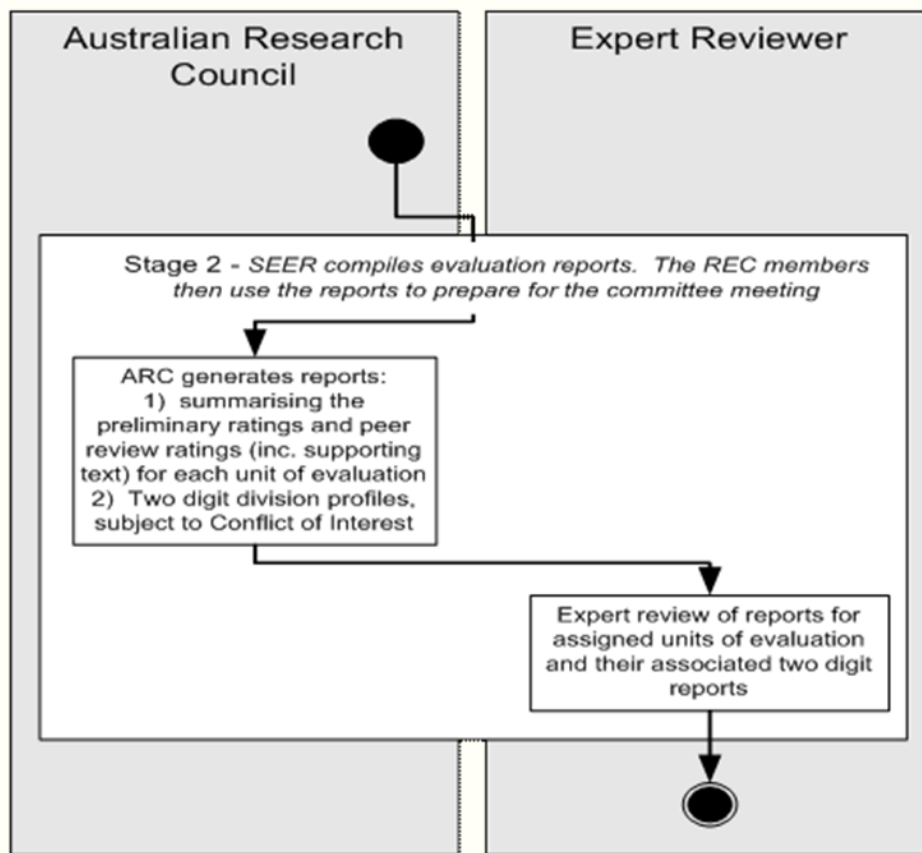
3. If an expert reviewer also completes peer review for a unit of evaluation, there is still only one preliminary rating given for that unit of evaluation. Peer review in this context does not get rated separately.

4. Not all units of evaluation will have a peer review component. Please refer to the Discipline Matrix for the relevant disciplines.



Three stages to evaluation

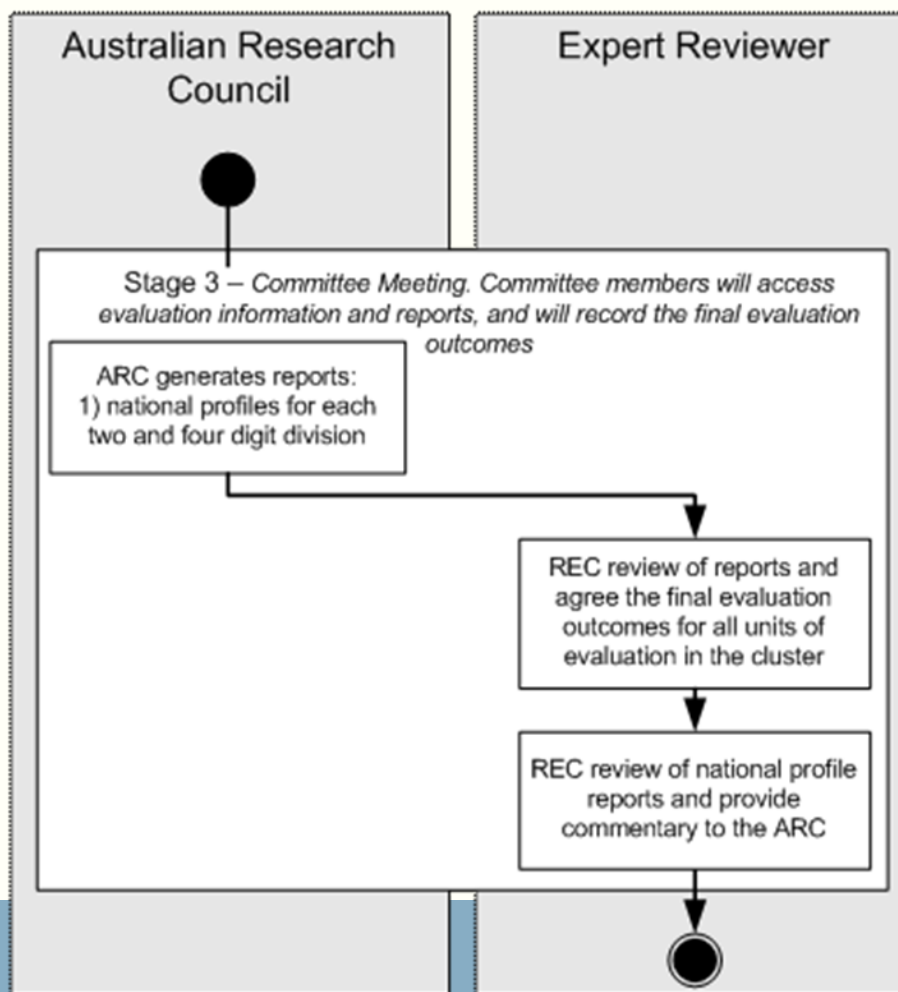
- Stage 2- page 32





Three stages to evaluation

- Stage 3- page 34



PCE – Evaluation



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Outputs

Ranked Journals

Citation Analysis

Supporting Information

Volume and Activity – outputs
and people

HERDC Research Income

Applied Indicators – Patents and
Commercialisation income

2- digit background statement





Low volume thresholds

- It is recognised that for some disciplines there may not be sufficient research volume to undertake a valid analysis at the four-digit level
- In these instances, the ARC will undertake quantitative analysis at the two-digit level
- All outputs will contribute to the national analysis and benchmarks





Evaluation guidelines

- ERA Evaluation Guidelines – working document for the trial in 2009
- Contents focus on: role and responsibilities of RECS and Peer Reviewers, outline of evaluation processes, and the rating scale





The Rating Scale

- On page 19 of ERA Evaluation Guidelines
- Ratings are 1 to 5 (5 the highest)
- In order to achieve a rating at a particular point on the scale, the majority of **output** from the Unit of Evaluation will normally be expected to meet the standard for that rating point.





The ERA “Dashboard”

- A series of quantitative profiles presented to a Research Evaluation Committee as proxies of quality for a Unit of Evaluation.
- Examples of the quantitative profiles are in the Evaluation Guidelines





Key Indicators on ERA Dashboard





Ranked Outlets

- Journals - compared against Australian institutions and international benchmarks
- Ranked Refereed Conference Publications (*under development for other Clusters – not PCE*)





Citation Analysis

- Relative citation impact (RCI)
 - Based on citation analysis using discipline-specific journal sets and yearly benchmarks
- Distribution of papers against RCI Classes
 - Based on RCI Classes for each paper
- Centile analysis
 - Distribution of papers based on world centile threshold and Australian institution average





Citation Analysis Benchmarks

- Field specific
- Yearly
- Australian institution benchmarks derived using indexed papers submitted for ERA
- World benchmarks derived using indexed journal sets





Other Supporting Information

- Volume and Activity – output types and people (FTE and headcount)
- HERDC Income Categories 1- 4 - *Income* - reported across all categories is interpreted as per the HERDC specifications, and compared against Australian benchmarks
- Standard patents sealed
- Research commercialisation income
- Two-digit background statement





Interdisciplinary Research

- ERA is a discipline-based evaluation
- Re-assignment of Two-digit and multi-disciplinary outputs
- Discipline Profile and its use
- Institutional tools (not part of evaluation)





Field of Research Re-Assignment

Field of Research	Primary	Secondary	Tertiary	Total	%
02 - Physical Sciences	113	65		178	26.4%
0201 - Astronomical and Space Sciences	71	16		87	12.9%
0202 - Atomic, Molecular, Nuclear, Particle and Plasma Physics	67	29	5	101	15.0%
0203 - Classical Physics	28	28	1	57	8.5%
0204 - Condensed Matter Physics	25	4		29	4.3%
0205 - Optical Physics	13	1		14	2.1%
0206 - Quantum Physics	83	80	7	170	25.2%
0299 - Other Physical Sciences	14	11		25	3.7%
0302 - Inorganic Chemistry	1	1		2	0.3%
0303 - Macromolecular and Materials Chemistry	2	1		3	0.4%
0306 - Physical Chemistry (Incl. Structural)	4	2		6	0.9%
0307 - Theoretical and Computational Chemistry	1	1		2	0.3%
Grand Total	422	239	13	674	100.0%

n = 674 PCE only assigned articles





Field of Research Re-Assignment

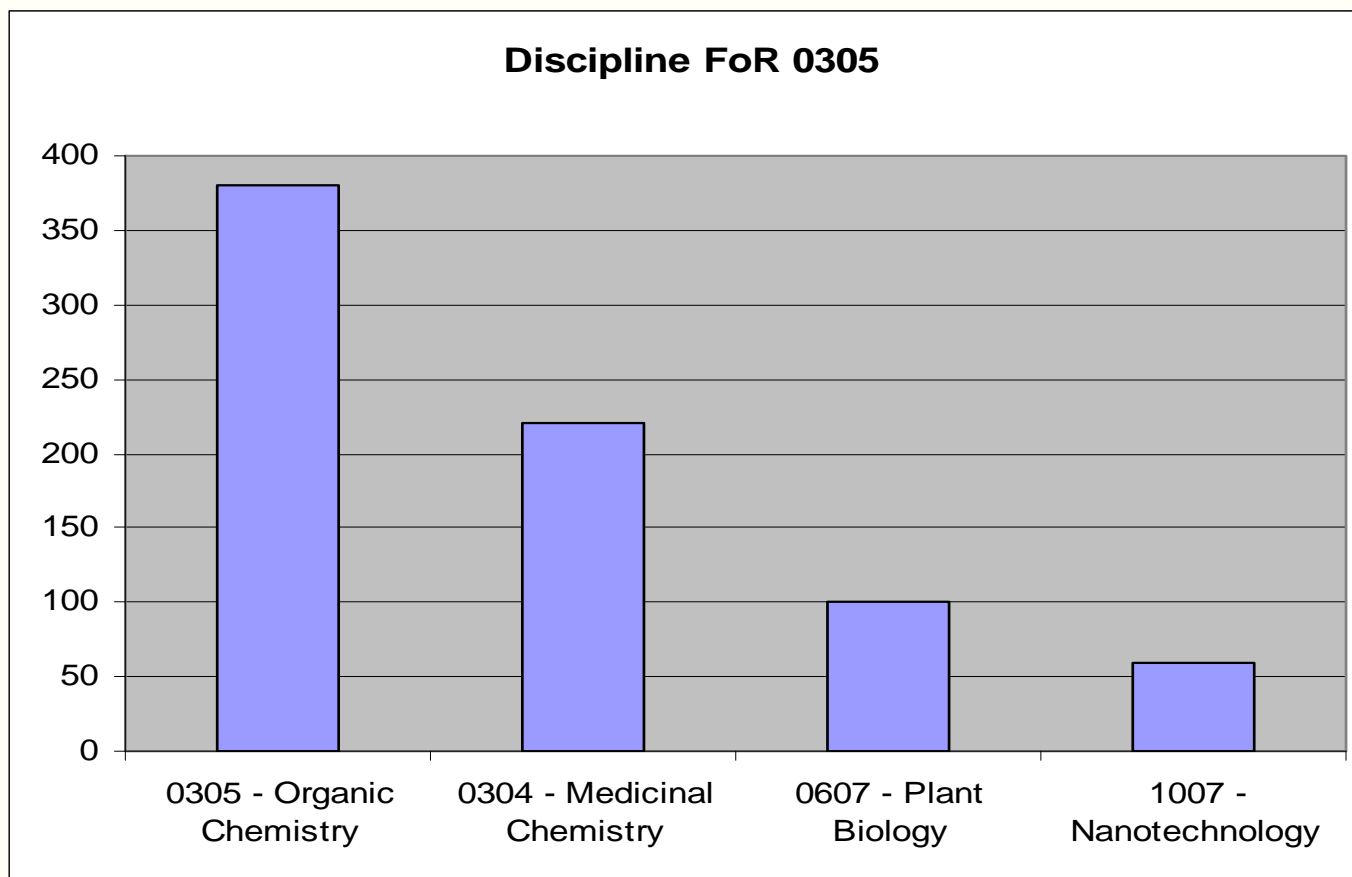
Field of Research	Total	%
0201 - Astronomical and Space Sciences	110	16.2%
0202 - Atomic, Molecular, Nuclear, Particle and Plasma Physics	143	21.1%
0203 - Classical Physics	75	11.1%
0204 - Condensed Matter Physics	57	8.4%
0205 - Optical Physics	19	2.8%
0206 - Quantum Physics	224	33.0%
0299 - Other Physical Sciences	37	5.5%
0302 - Inorganic Chemistry	2	0.3%
0303 - Macromolecular and Materials Chemistry	3	0.4%
0306 - Physical Chemistry (Incl. Structural)	6	0.9%
0307 - Theoretical and Computational Chemistry	2	0.3%
Grand Total	678	100.0%

n = 678 articles (incl 4 multidisc)





Example Discipline Profile – Four-digit





Institutional Tools

- Institutions may tag research outputs with two institutional codes and two research theme codes
- This will assist in recompiling data
- The tagging will not be used for ERA evaluation purposes





What data will the ARC return to Universities?

- Static citation count for each indexed article
- Australian (HEP) benchmarks for each year of the reference period (by FoR)
- World benchmarks for each year of the reference period (by FoR)
- Centile citation thresholds for each year of the reference period (by FoR)





ARC – outcomes of trial

- Trial for PCE and HCA – review of process and outcomes
- Data back to institutions, plus a national outcomes report
- Lessons learned will inform the full evaluation in 2010

