ERA Challenges for Australian University ICT

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Abstract
The ERA 2010 rankings reflect badly on Australian university ICT performance, especially by comparison with some likely benchmark disciplines, for reasons not exclusively under the control of ICT researchers, groups or schools. As a result nevertheless, the future of Australian academic ICT is under threat of reduced government funding, from diminished international reputation and from university reaction. Changes to ERA for 2012 may ameliorate the position somewhat, but continued complementary and concerted action by individuals, institutions and professional organisations such as ACS, CORE and others remains imperative.

Keywords: ACS, ARC, CORE, ERA, NICTA, RAE, REF, RQF

1 Introduction
The purpose of this paper is to raise awareness among the Australian Computer Science academic and research community about the threats posed to Australia’s higher education capabilities in ICT research and teaching by the Excellence in Research for Australia (ERA) scheme and especially the results of the 2010 exercise. In particular, we consider how these threats may conceivably originate in ERA’s and universities’ treatment of ICT, and what kind of cooperative action could lead to win-win outcomes for all concerned.

It is not our purpose to rehash or to engage in the controversies surrounding ERA, but some history is useful. ERA may be thought to have its origins in the UK Research Assessment Exercise (RAE) and its proposed successor Research Excellence Framework (REF) as currently documented at the REF website http://www.hefce.ac.uk/Research/ref/. RAE has been conducted approximately 5-yearly since 1986, and REF has been envisaged to commence in 2014. Academic disciplines at UK universities have been ranked on a number of measures, primarily by the outputs of continuing academics, and the published rankings impact variably upon government funding and institutional reputation. Some of the improvements reflected by REF can be identified in ERA, including the use of bibliometric quality indicators.

Australia’s ERA was preceded by the abortive Research Quality Framework (RQF), and (like REF over RAE in the UK) ERA promised more accurate measures of research quality, especially metrics (Department of Innovation, Industry, Science and Research, 2008). Implementation of ERA in 2010 was preceded by a trial in 2009 involving research grouped into two “discipline clusters”: Physical and Chemical Sciences; and Humanities and Creative Arts.

2 ERA 2010 Processes
The full ERA was consequently conducted during 2010 according to the following broad parameters, sourced from ARC’s ERA 2010 Evaluation Guidelines (Australian Research Council, 2010).

2.1 Terms of assessment
A wide range of objects of assessment (see below) were assessed across eight discipline clusters (Cluster Five—Mathematical, Information, and Computing Sciences being most relevant to ICT as we shall see). Within each cluster, research was classified and assessed in terms of “disciplines” as per the four-digit and two-digit Fields of Research (FoRs) as identified in the Australian and New Zealand Standard Research Classification (ANZSRC) (Australian Bureau of Statistics, 2008). The “four digit” disciplines represent specialisations of the “two digit” disciplines; in particular the latter subsumed the former and additionally material that did not meet quantity thresholds for assessment under the former was nevertheless eligible for assessment under the latter. The two-digit FoR code 08 Information and Computing Sciences was most applicable to ICT, though several others were more or less applicable. The following lists the most relevant:

- 08 Information and Computing Sciences
  - 0801 Artificial Intelligence and Image Processing
  - 0802 Computation Theory and Mathematics
  - 0803 Computer Software
  - 0804 Data Format
  - 0805 Distributed Computing
  - 0806 Information Systems
  - 0807 Library and Information Studies
  - 0899 Other Information and Computing Sciences

- 10 Technology
  - 1005 Communications Technologies
  - 1006 Computer Hardware

Some ICT research may also have been classified under 0906 Electrical and Electronic Engineering.
It must be noted that it was outputs that were classified not researchers; and some outputs from ICT researchers would have been classified under other codes, especially interdisciplinary work where ICT was an enabling technology. This was because outlets (not publications) were assigned FoR codes, so that an essentially computer science publication in an application domain journal or conference would have been recognised under the FoR code(s) of the application domain, not 08 etc.

Each university’s submission under the above framework (at the two- and four-digit levels) constituted a “Unit of Evaluation” (UoE) against which a university’s performance was assessed and published. In order however to be assessed, a unit’s output had to meet a threshold over the six-year period of evaluation – for all of the ICT disciplines listed above, (both two-and four-digit codes) this was 50 articles in journals (not conferences) recognised under the ranking scheme (see below) over the period of assessment (see below). Thus, while some four-digit UoEs might not have been assessed for not meeting the threshold, the research outputs were still eligible for consideration under the covering two-digit unit.

2.2 Objects of assessment

Even though ranked journal publication outputs provided the exclusive qualification for meeting thresholds, a rich set of objects were considered when assessing research performance in a UoE.

- Research Outputs (primarily books/chapters, journal articles, conference papers in selected disciplines including 08 Information and Computing Sciences) for a six-year period: 1 January 2003–31 December 2008
- Research Income (in terms of HERDC categories: Australian Competitive Grants; other public sector research income; CRC income) for a three-year period: 1 January 2006–31 December 2008
- Applied Measures (research commercialisation income, patents, registered designs, plant breeder’s rights and NHMRC endorsed guidelines) for a three-year period: 1 January 2006–31 December 2008

2.3 Subjects of assessment

Even though assessments of research outputs were not organised around individual producers of research, a credible affiliation with a university for the period of assessment needed to be demonstrated for an individual’s research (objects as summarised above) to be considered:

- on the census date of 31 March 2009, to have been a paid employee or in some other relationship, including as a visiting academic; and
- if not a paid employee, to have that affiliation substantiated by a publication association.

A researcher’s affiliation on the census date determined the university to which credit for the objects of assessment was allocated; but for non-paid employees, only publications that explicitly cited that university were included in the assessment.

2.4 Criteria of research output assessment

Research outputs (publications) were included for assessment only if in recognised outlets. Recognised outlets were ranked according to criteria as follows:

A* (journals only): one of the best in its field or subfield; typically covering the entire field/subfield; all or nearly all papers will be of a very high quality where most of the work shapes the field; acceptance rates will typically be low and the editorial board will be dominated by field leaders, including many from top institutions (leaving aside the question of circularity raised by the last point).

B: Tier A journals (or conferences) will mostly be of very high quality and would enhance the author’s standing, showing they are engaged with the global research community; journal acceptance rates will be lowish and editorial boards will include a reasonable fraction of well known researchers from top institutions; conference acceptance rates will be low and program committee and speaker lists will include a reasonable fraction of well known researchers from top institutions, with a high level of scrutiny by the program committee to discern significance of submissions.

C: Tier B journals (or conferences) that do not meet the criteria of the higher tiers; but are nevertheless worthy of consideration in ERA. Outputs that do not achieve a C ranking are not considered at all.

As well as the ranking of the outlet, publications were assessed by citation count. Verbal testimony to the author was that citations took priority over journal rankings – one may speculate that for more recent publications where citations might as yet be unlikely, outlet rankings served as a proxy.

While the ranking scheme commands admiration as an open and accountable basis for assessing the quality of research outputs, and importantly as a target for institutional- and self-improvement, it has attracted fair criticism for the errors and omissions that risk inducing distorted behaviours by academics and institutions seeking to maximise their ERA outcomes. In her report of the demise of rankings for ERA 2012 (see further discussion below), Rowbotham (2011) gives some typical examples of these.

2.5 Results of assessment

Results for each UoE were expressed in a six-point rating scale.

5 : The UoE profile is characterised by evidence of outstanding performance well above world standard presented by the suite of indicators used for evaluation.

4 : The UoE profile is characterised by evidence of
performance above world standard presented by the suite of indicators used for evaluation.

3. The UoE profile is characterised by evidence of average performance at world standard presented by the suite of indicators used for evaluation.

2. The UoE profile is characterised by evidence of performance below world standard presented by the suite of indicators used for evaluation.

1. The UoE profile is characterised by evidence of performance well below world standard presented by the suite of indicators used for evaluation.

n/a: Not assessed due to low volume. The number of research outputs did not meet the volume threshold standard for evaluation in ERA.

Assessments were undertaken for each four- and two-digit disciplinary (FoR code) unit for which the output threshold (50 journals) was achieved.

3 ERA 2010 Outcomes for ICT

Outcomes for Australian university ICT in ERA 2010 were not without successes, but it is arguable that the overall performance was less than desirable. The source for all our data is the ERA 2010 outcomes summary published by The Australian (Hare, 2011).

3.1 ICT research performance

Raw data of ICT research scores in 2010 ERA is summarised in Table 1. It includes the results that contributed to Cluster Five - Mathematical, Information and Computing Sciences, i.e. FoR code 08 (Information and Computing Sciences) and its sub-disciplines, and the subdisciplines of FoR code 10 (Technology) most applicable to ICT.

3.2 Benchmark analysis of ICT research performance

Because of the evident dominance of FoR code 08 Information and Computing Sciences (ICS) and its constituent (sub-)disciplines in evaluated (i.e., above-threshold) ICT research, these data will be the focus of our comparison between ICT other disciplines. Table 2 compares overall ERA outcomes in ICS (2-digit level 08) with those of some benchmarks in science and engineering with which ICT is likely to be compared by interested parties.

The message sent by table 2 is that as measures of increasing comparable quality are taken into account, ICT research performs increasingly badly against its likely benchmarks:

- Generally somewhat fewer universities managed to meet ERA performance thresholds in ICT
- The discrepancy becomes ever more-pronounced in more specialised areas (4-digit FoR codes)
- The discrepancy is likewise more-pronounced as higher levels of achievement against world benchmarks are reflected. Thus: while ICT research is at least of world standard at approximately 66% of the number of universities at which science/engineering is, when we progress to a level of at least above world standard, the relative percentage for ICT drops to 50%; and when we progress to a level of well above world standard, the relative percentage drops to close to 5%.
- This impression of ICT’s relative poor performance to likely benchmarks is corroborated by the comparison of ICT scores with university averages: ICT research scored at or above average results at approximately only 20% of universities, whereas science/engineering performed at or above average results in approximately 45% of universities. It is clear that in many cases, poor ICT scores contributed to poorer-than-otherwise university outcomes. Moreover, in the relatively few cases where ICT performed at or above average, that was largely in the context of overall poor performance by the relevant university. There were only three at-or-above-average results for ICT where the university as a whole performed at or above world standard.

3.3 Bases for Poor ERA Outcomes for ICT

A number of factors may have combined to give these disappointing results.

a) The relative fine granularity of FoR codes pertaining to the ICS discipline would generally have diminished the relative performance of ICS compared to other broad disciplines. For example, the entire field of Engineering was also covered by a single two-digit code, whereas substantial sub-disciplines (e.g. Chemical, Civil, Electrical Engineering) had only four-digit codes. Further, this fine granularity for ICS would have militated against the achievement of thresholds especially at four-digit level, though failure to register at four-digit level did not necessarily preclude a good result, e.g. RMIT achieved a two-digit score of 3 without having met any four-digit thresholds.

b) ICT is particularly at risk of being submerged into other disciplines, especially in view of its role as a fundamental enabling technology for contemporary scholarship in life sciences and the humanities, and not just in the engineering and physical sciences. Because FoR codes were assigned to outlets (journals or conferences) rather than specific publications, publishing a computer science breakthrough in its application context would have led to no recognition of the publication as a computer science contribution (08 FoR-coded). For example, a data mining breakthrough published in a life sciences journal would have been recorded under FoR codes 03, 05 or 06. Moreover as noted, some ICT fields were classified under “Engineering” or “Technology” (communications or hardware).

c) The citation coverage service used by the 2010 ERA (Scopus) is frequently claimed not to cover ICT well, nor conferences.

d) The exclusion of conferences from threshold counts is inconsistent with including conferences in the overall ICT research outputs.

e) Research performance was measured against international benchmarks of university quality and quantity output, and was not pro-rated for small units (viz. the firm threshold of 50 ranked journal articles).
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</table>

* “O’all Avg.” refers to the overall institutional average.

Table 1: ERA 2010 results for ICT disciplines
Table 2: ERA 2010 outcomes for ICT disciplines c.f. other science and engineering

<table>
<thead>
<tr>
<th></th>
<th>ICS</th>
<th>Biology</th>
<th>Engineering</th>
<th>Maths</th>
<th>Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>scored at all (2-digit FoR at least)</td>
<td>24</td>
<td>34</td>
<td>31</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>also scored one or more 4-digit FoR</td>
<td>13</td>
<td>27</td>
<td>24</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>also scored two or more 4-digit FoR</td>
<td>8</td>
<td>24</td>
<td>19</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>also scored three or more 4-digit FoR</td>
<td>2</td>
<td>21</td>
<td>17</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>scored at or above world std (score 3 or greater)</td>
<td>14</td>
<td>23</td>
<td>22</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>scored above world std (score 4 or greater)</td>
<td>5</td>
<td>11</td>
<td>9</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>scored well above world std (score 5)</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>scored at or above uni. average</td>
<td>8</td>
<td>21</td>
<td>16</td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

f) The significant decline in Australian university ICT academic staff numbers since 2000 must therefore have impacted significantly on the evaluation, as successive rounds of redundancies have seen the departure of numerous productive research personnel, recalling that individuals needed to have a demonstrable association with a university by the 31 March 2009 census date for their research output for the 2003-2008 period to be attributed to that university. Some university ICT organisational units lost of the order of 50% of their academic staff- at that scale of retraction, it is difficult not to lose a number of research-capable staff, and anecdotal evidence supports the contention that a significant number of high-achievers took the opportunity to take effective early retirement.

g) The significant national investment in university-derived ICT research represented by NICTA goes unrecognised because NICTA-funded staff are employed directly by NICTA rather than by universities funded from NICTA. This contradicts the normal pattern of Australian research funding.

While the past downsizing is beyond the control of the ARC, the above catalogue (items a-e) suggests that the current ERA system includes pitfalls that need to be taken into account when attempting to modify organisational and individual behaviours to optimise future ERA outcomes.

4 Impact of Poor ERA Outcomes for ICT

These poor outcomes place university ICT at risk in various ways.

4.1 Funding threats

ERA is part of the wider Sustainable Research Excellence in Universities (SRE) initiative which aims to compensate for the gap in funding for the indirect costs of university research, including hitherto uncosted items such as proportions of academic staff salaries, and more realistic costing of technical and administrative research infrastructure (for broad information see the SRE Website http://www.innovation.gov.au/Research/ResearchBlockGrants/Pages/SustainableResearchExcellence.aspx).

Following a trial in 2010 for funding allocation in 2011, SRE funding will in future be contingent upon ERA performance: approximately 67% of the funding available under the scheme (“Threshold 2”, worth approx. $81M across the sector in 2011) is at stake in future (Department of Innovation, Industry, Science and Research, 2011). SRE extends the existing RIBG (Research Infrastructure Block Grants) and it is not inconceivable that RIBG may be rolled into SRE in future.

$81M distributed across 41 universities on the basis of ERA outcomes is barely significant and probably approaches the overall university- and government-side costs of administering the exercise. However, now that
the principle of “excellence”-based distribution of public funds has been established, influential forces will be at work to increase its impact in future. It can be assumed that whatever revenue is earned by universities as a result of ERA will largely return to the research-successful disciplines that “earned” same.

4.2 Reputational threats

While direct ERA-based public funding remains relatively insignificant, the early impact of ERA on other sources of funding and other enablers of university effectiveness could be significant.

- In the absence of a national teaching assessment, ERA is likely to serve as a proxy for overall rankings and thus become critical to Australian universities’ profiles as destinations for international fee-paying students at all levels. For example, http://www.australian-universities.com/rankings/ lists a number of rankings of Australian universities, with ERA-derived rankings prominently displayed (and by virtue of the level of detail supplied, apparently most authoritative as well). In view of the dependence of Australian universities on international student numbers (some over 50% - see http://www.students.idp.com/study/australian_universities.aspx), the budget impact of same being heightened by the excess of international student fees charged by many universities over government subsidies for domestic students.

- In view of the emphasis placed on research achievement in academics’ career development and prospects, the poor research rating of Australian university ICT will act a strong disincentive for ICT academics to consider Australian universities; top international researchers will be less likely to consider Australia; and top Australian researchers will be tempted increasingly to pursue their careers overseas. The threat to Australian ICT research capacity is obvious, but the threat also applies to the quality of ICT education: while the research-teaching nexus may in some cases be exaggerated, it is undoubtable that a significant number of advanced-level Australian ICT courses benefit from being taught by active researchers in the relevant fields; and while there may be some truth to the stereotype of the brilliant but inarticulate researcher, it is often the case that excellent academics excel in both dimensions of endeavour – teaching as well as research. Any threat to the attraction and retention of excellent ICT researchers in Australian universities is a real threat to Australian ICT education.

- In similar vein, any distraction from the appeal of Australian universities to prospective research students (masters and PhD) will further detract from the appeal of Australian universities to research academics and will in itself substantially impact upon Australian universities’ research capacity. In view that the global market for PhD students is becoming one in which top students are awarded fee waivers or equivalent scholarships, these threats are probably more significant in the long run than any impact on fee income from this class of student.

4.3 Internal threats

The financial and reputational pressures upon universities (see above) to improve their ERA scores could conceivably have beneficial impact upon ICT, as universities seek to remedy deficiencies made apparent by ERA.

On the other hand, one may not unreasonably fear that universities may be tempted consider other options to improve their ERA scores, not necessarily to ICT’s advantage. For example, a reasonable strategy that might be adopted would be for a university to invest in areas that have demonstrated their potential to perform by relatively good ERA results, but which have room for improvement. Under such a scenario, below-average performances in the ICS disciplines might very well not meet universities’ criteria for development investment. Indeed, the temptation to remove resources from “losers” in order to maximise the further prospects of “winners” might see a catastrophic decline in ICT’s position in a number of universities.

Moreover, for universities at which ICT was unranked (over 40%!), a choice decision now confronts them. Any effort to put ICT “on the map” runs a considerable risk in that it will be difficult for universities to determine with confidence that the result will actually be creditable. An unranked performance is the result of not meeting the publication output threshold, and might be transformable into a rated one by transforming academics’ behaviours to pursue ranked outlets in future. That is however no guarantee that the resulting ERA assessment would be one that the university desires. At the very least, any future below-average ERA result for ICT is one that is likely to attract a university’s disapproval.

Finally, it must be emphasised that it is not just Australia’s ICT research capacity which is under threat in this way. As well as the broad risk to the quality of Australian ICT academic staff, the very existence of ICT as an academic endeavour at some universities may be under question.

4.4 A vicious cycle threatens

To summarise, Australian university ICT is threatened by a vicious cycle of poor ERA evaluations leading to reduced resourcing and reputation leading to reduced performance leading to poorer ERA evaluations etc.

5 What to Do?

While it may be the case that Australian ICT suffers from systemic deficiencies, it is essential in the first place that the picture revealed by the ERA microscope is an accurate one.

Even though the 2012 ERA exercise has effectively already begun (reference period for publications was six years until 31.12.10; census date for staff is 31.3.11 - see http://www.arc.gov.au/era/era_2012/important_dates.htm for ERA 2012 Important Dates), various stakeholders could still usefully engage in (initiate or maintain) activities that could lead to improved outcomes if not in 2012 then in likely subsequent ERA exercises.

5.1 Changes to ERA 2012

First, reactions in word or deed need to be cognizant of
how the ERA rules are evolving.

5.1 ICT-specific changes

At the ICT disciplinary level, representations led by CORE have resulted in two major developments.

- Conferences will be included in the count of outputs required to meet the publication threshold for a UoE to be evaluated.
- The quality of ICT publications will be measured by peer review rather than citations.

While the removal of the current (2010) debatable basis for citation analyses has to be welcomed, it needs to be recognised that peer review is not the only option. Other analyses such as CiteSeer’s (Lawrence et al., 1999) or Google Scholar http://scholar.google.com.au/ could conceivably be demonstrated to the ARC as having an authority for ICT comparable to Scopus for natural science.

Potentially more risky is the inclusion of conference outputs in UoE thresholds: at present, unranked UoEs at least “fly below the radar” and may well attract less adverse attention than those which are ranked but badly. Clearly some institutions have perceived this change to be advantageous, but it may very well be not universally so. Judgment will however have to be suspended until ERA 2012 results are released and compared to ERA 2010 outcomes.

5.1.2 Overall changes

Changes across the entire ERA 2012 process are outlined in the ERA FAQ http://www.arc.gov.au/era/faq.htm, especially:

- abolition of the controversial publication rankings (Rowbotham, 2011) in favour of a “refined journal indicator”;
- conferences are not a priori assigned FoR codes;
- more flexible FoR coding will better reflect interdisciplinary research achievement;
- output thresholds for peer reviewed disciplines will be aligned with citation-analysed disciplines (conveniently for ICT)

Instead of recording UoE’s publications according to outlet rank, outlets will be listed in order of frequency of occurrence of publication in the UoE (absolute and relative), the idea being that assessment panels will be able thereby to discern if the UoE’s publication profile represents quality (or not). While it is understandable that the ARC has resiled from the hitherto inflexible ranking scheme, it is not clear that that new system will be without its drawbacks. For example, for UoEs trying to improve their performance (which is what ERA is all about, surely), the ranking system at least provided guidance.

The ARC will continue to maintain a list of admissible journals and their default FoR codes, but conferences will be unclassified (and so the idea of a conferences list becomes somewhat redundant). For ICT, peer review will apparently be the means by which the quality of conferences publications is measured.

The obstacle in ERA 2010 to the reflection of interdisciplinary research achievement (so important for ICT in its enabling role) was the inflexibility of FoR-coding of publications. Publication of significant ICT research in an application area’s journal lead inevitably to that research being classified according to one of the application area FoR codes. Under ERA 2012, following a trial for mathematical sciences in ERA 2010, individual journal articles will be able to be reassigned to FoR codes other than that of the journal in which they appear provided that at least 66% of the paper’s content lies in the “new” area. For conferences the lack of a priori FoR-coding reinforces that degree of flexibility.

There may also be an increase in the amount of information to be submitted for peer review. For ERA 2010 peer reviews, UoEs were required to nominate 20% of their outputs for submission to the peer review process, as specified in the ERA 2010 Discipline Matrices see - http://www.arc.gov.au/xls/ERA2010_discipline_matrices.xls. For the ERA 2012 consultation process, a figure of 30% is said to have been proposed but the submission deadline against the Draft ERA 2012 Submission Guidelines and Discipline Matrix has passed (1 August), and “Page not found” is the result of attempting to access http://arc.gov.au/era/era_2012/era_2012_documents.htm.

5.2 What can ICT researchers and groups do?

For the immediate future (i.e. ERA 2012), there is little that individual researchers can do. For example, the survey period for publication data has long ago closed (31.12.10), as have the various ERA 2012 consultation cutoff dates.

For subsequent ERA-style exercises in the medium/long term however, a number of lines of development suggest themselves for attention; some more useful than others.

5.2.1 Focus

It may be tempting for universities especially with relatively small numbers of ICT researchers to improve outcomes, especially at the four-digit FoR level, by concentrating on a very few, maybe even one, research areas. As well as potentially improved ERA scores, this is a means by which the issue of critical mass may be addressed. However there are means by which small numbers of effective researchers can manage to establish effective connections (with PhD students, with collaborators at other institutions, through NICTA). Further, lack of recognition at ERA four-digit level does not appear to exclude a good result at two-digits (e.g. the “world standard” evaluation achieved by RMIT for two-digit ICS without any four-digit result). Thus, imposition of a tighter research focus does not in itself seem to be a priority (as opposed to any which may emerge as a result of differentiation – see below).

5.2.2 Select

It would be advantageous for selection of publication outlets needs in future to be much more attuned to ERA requirements (i.e. listed journals and conferences), noting that the journal-only threshold for ICT will be relaxed to include conferences for 2012. For the future, the abolition of explicit ranks makes it impossible to offer counsel about the trade-off between pursuing one outlet vs another. e.g. in terms of chance of acceptance vs. ERA.
kudos. Had the journal ranking scheme been retained, it might have been possible at least to have given advice to colleagues based on extremes of quality (e.g. A* vs. C). It should however be noted that it is not clear how much weight was attached in 2010 to varying kinds of performance, i.e. higher vs lower ranked outlets, ranking vs citations, conferences vs journal (other than meeting the threshold).

Hopefully the refined journal indicators of different institutions’ UoEs will be published. As well as giving guidance to the community about what is regarded as quality publication patterns, this would offer an important measure of accountability of assessors’ performance.

Other kinds of quality-reflecting behaviours should not be neglected, e.g. competitive grants and industry contracts. Senior staff would do well also to pursue esteem measures such as prestigious fellowships and memberships of boards. The celebrated unsociability of ICT experts will need to be overcome.

5.3 What can universities do?

Universities have options other than to wind-down apparent poorly-performing ERA organisational units.

For the longer-term, a number of lines of development suggest themselves for attention in parallel with those that can be undertaken by individuals and research groups.

5.3.1 Differentiate

In the light of possible significant levels of actual research capability among staff, it does not seem wise to maintain an even distribution of teaching load in some cases at relatively high-levels compared to some of the other more successful ERA disciplines.

5.3.2 Invest

Differentiated workloads for staff on the basis of research capability represents a significant HR investment, and would well be matched by other kinds of investment in ICT research capability. In particular, the prevalence in the global market for PhD students of fee waivers and stipends indicates that any perception of (high-quality) PhD students as a significant source of revenue will have diminishing validity. Rather, PhD students should be thought of as relatively high return on investment research personnel, in a sense as amplifiers of their supervisors’ capabilities. Needless to say, the more capable the supervisor, the more effective the amplification. Other more expensive HR investments could be considered (such as hiring research “stars”), but this author is of the opinion that quality PhD students are the royal road to research productivity. Fee waivers and living stipends for top-quality PhD students should be greatly encouraged as a general rule across all disciplines.

For ICT specifically however, it is well past time for (some) universities to stop treating ICT as a cash cow to be sent to the slaughterhouse once it’s stopped giving cream. During the ICT boom of the 1990s, universities as a whole did very well from the overheads charged on ICT student income (government subsidies and mostly international fees), but during the following decade of downturn ICT organisational units were drastically pruned proportionate to the drop in revenue. This makes for an interesting contrast with the treatment of some other disciplines the research capability of which was preserved by internal subsidies from universities until their enrolments problems corrected themselves.

5.4 What can the ICT community do?

Australian ICT leadership groups (particularly ACDICT, ACS, CORE, ACPHIS and ALIA - see Glossary) have collaborated to an encouraging degree to improve ICT’s position for 2012. In particular, the opportunity was taken jointly to advocate a consensus position to the ARC on key problem areas cited above (i.e. of citation analyses, inclusion of conferences in thresholds and flexible treatment of interdisciplinary research outputs). CORE undertook to lead the follow-through with evident success: in each case ERA 2012 will proceed with the ICT community’s submissions reflected in the changed procedures also documented above.

It will be important to build upon this unity, and better to include other key organisations (such as AIIA, EA’s ITEE College and NICTA), in pursuing some further ERA-related reforms, such as the following:

• while peer reviewing may yet prove to be to the satisfaction of all concerned, the viability of alternative bibliometrics (such as Google Scholar and CiteSeer) should be explored thoroughly;

• NICTA’s own research personnel should routinely be found adjunct or honorary appointments in the university labs with which they are associated;

• the new refined journal indicators for each UoE that will replace journal rankings in ERA 2012 should be published for reasons of (i) openness and accountability, and (ii) exemplifying desirable patterns of publication behaviour for future performance improvement across the sector;

• in similar vein, the relative weightings attached by ERA assessment panels to the various objects of evaluation should be explicating.

Not all future community action needs however to be explicitly focussed on ERA processes. In particular, universities need to receive loud and clear messages from the ICT community not to adopt hasty and punitive responses to the flawed assessment of ICT in ERA 2010. In this regard, it will be essential that the lead is taken by organisations other than those which may be thought to have the strongest vested interests, in other words by professional and industrial bodies such as ACS, AIIA, ALIA and EA/ITEE rather than academic groups such as ACDICT, CORE and ACPHIS. More generally, the industry/professional groups need to be in a position to advocate for the continued vitality of the research sector of the Australian ICT scene, which can only be the case if continued closer contact with them is maintained by academe.

6 Conclusions

Some process such as ERA is inevitable at this stage in the development of Australian higher education policy; it may well not be the case that ERA will be a long-standing, let alone a permanent feature of the Australian higher education policy landscape. Coming as it does however when Australian university ICT is struggling to
recover from a severe period of retrenchment, it is essential that any misunderstandings of ICT research that it creates and perpetuates do not go unchallenged.

Our main message however is that opportunities for proactive response to the challenges posed by ERA 2010 are both rich and rewarding:

- rich, in the sense that there is a wide range of opportunity for individuals, groups, institutions and the entire ICT community (industry/professional as well as academe);
- rewarding, in the sense that concerted action to date has been evidently fruitful.

In particular, the ICT community needs to organise and communicate better among its constituent parts in order to secure better outcomes for the whole. If there are indeed systemic problems with Australian ICT research, this would likely feature among the means of addressing them. It is as if the notorious unsociability of the stereotypical ICT researcher or professional needs as much remedying at the community level as well as the individual. If the ERA 2010 “lemon” becomes the “lemonade” that helps achieve this, we will jointly have accomplished much more than having scored a victory (however important) in the government funding game.

7 Disclaimer
The views expressed in this paper are those of the author alone, and neither of The University of Queensland nor of the Australian Computer Society.

8 Acknowledgements
Numerous colleagues in the Australian university and ICT professional community have offered the benefit of their insights on ERA in the development of the above, especially CORE President Prof. Tom Gedeon. Anonymous referees’ suggestions have improved the presentation greatly.

9 References

10 Glossary
ACDICT: Australian Council of Dean of ICT
ACPHIS: Australian Council of Professors and Heads of Information Systems
ACS: Australian Computer Society
AIIA: Australian Information Industry Association
ALIA: Australian Library and Information Association
CORE: Computing Research and Education Association
EA: Engineers Australia
HERDC: Higher Education Research Data Collection
ITEE: Information, Telecommunications, and Electronics Engineering College (of EA)
NHMRC: National Health and Medical Research Council
NICTA: National ICT Australia