The Unexamined University:
The Evolution of UWA’s Research Management Tool, Socrates

Abstract
In late 2006 the University of Western Australia launched Socrates, a web-based application designed to draw data from key research information systems, in order for the University to prepare portfolios for the Research Quality Framework (RQF).

This paper explores the evolution of Socrates from an application designed for the RQF, to a research quality management tool. The paper argues that Socrates has allowed the University to identify areas of strength and weakness within its research performance, and has provided researchers with an ability to recognise how they compare to their peers. Data visualisation tools have allowed researchers and research managers to construct a view of their research performance, and to manage research strategically. Overall, Socrates has provided UWA with an invaluable tool for the examination of its researchers and their performance, and the system’s introduction has led to significant behavioural changes.
Introduction
In late 2006 The University of Western Australia (UWA) launched Socrates, an online application designed to draw data from key research information systems, in order for the University to prepare portfolios for the Research Quality Framework (RQF).

A ‘Socratic Index’ was developed, which scored each researcher’s Inputs (grants) and Outputs (publications) over the RQF census period. As a result, distributional statistics, including the averages for research groups, schools, faculties, academic levels and the University as a whole were created, and for the first time, the University’s Executive was able to examine and compare the research performance of different sections of the University. Once the utility of Socrates was recognised, and in light of the influence of international rankings, the Socratic Index (SI) was expanded to include a TISI Index, which scores the number of publications a researcher has had indexed within the Thomson Reuters’ Web of Science over a six year time frame.

This paper explores the evolution of Socrates from an application designed for the RQF, to a research quality management tool. The paper argues that Socrates has allowed the University to identify areas of strength and weakness within its research performance, and has provided researchers with an ability to recognise how they compare to their peers. Overall, the paper contends that Socrates has provided UWA with an invaluable tool for the examination of its researchers and their performance, and its introduction has led to significant behavioural changes. The format of this paper will proceed as follows: first, the evolution of Socrates will be discussed, in reference to the literature on bibliometrics and measuring research performance. Next, the development of Socrates and the introduction of data visualisation tools, which have allowed researchers to construct a view of their research performance, as well as allow research managers to administer research strategically, will be explored. Finally, the paper outlines the influence that Socrates will have over both research behaviour and research management at UWA in the future.

Socrates Development
The University of Western Australia decided in early 2006 that in order to prepare for the Federal Government’s proposed Research Quality Framework (RQF), an online application capable of bringing together key data necessary for the formation of research groups was required. In December 2006, Socrates was launched. The system draws data from the UWA human resources database, the student database, the publications database and the grants database, as well as from the Thomson Reuters product Web of Science (commonly referred to as the TISI WOS), to provide citation data for staff members’ publications. Socrates is then able to collate data for individual staff members to create a detailed research profile, showing their publications, citations, grant income and HDR load.
Having established a profile for individual researchers, it was then necessary to provide a measure, whereby the research performance of staff could be judged. A Socratic Index was introduced to help the University gauge the level of research productivity for its staff.

**Socratic Index**
There are currently three forms of Socratic Indexes (SI) utilised within Socrates; the first, and the default view, is the UWA SI and it reflects the way in which internal funding flows according to research activity; the second, called the Government SI, reflects the way in which income is gained by the via the Federal Government’s block grant schemes; the third index is the TISI SI. This third index relates only to performance in publications that are indexed through the Thomson Reuters ISI WOS. All three indexes are a measure of research performance over a six year period and in total they rely on two forms of data, Research Outputs (ROPs), namely publications, and Research Inputs (RIPs), that is, competitive grant income. The difference in the three measures rests in the manner in which publications are weighted.

The UWA SI takes into account all publications attributed to an author within the UWA publications database over the previous six year period. Each year, when UWA collects publication data for the Higher Education Research Data Collection (HERDC), additional publications not acknowledged by HERDC are also collected. The range of publications is similar to that outlined in the former RQF guidelines and includes items such as scholarly reviews, musical compositions, and catalogues. Publications listed in the UWA database are assigned both HERDC (referred to as Government) points and UWA points. UWA points differ not only in the wider range of publications they are attributed to, but in the fact that there is a significant increase in the weighting of books, while the points attributed to conference papers are halved when compared to Government points. UWA points have been used in the University’s faculty funding model since 1992, and are well recognised as a driver of research performance (Butler, 2003a, pp. 39-46). The UWA SI advantages the Social Sciences and Humanities, due to the weighting for books, while disadvantaging areas such as Engineering, where a significant amount of research is published in refereed conference proceedings.

The Government SI simply substitutes UWA points for HERDC publication points, and thus advantages engineering disciplines while removing the advantage provided to researchers publishing books.

The TISI SI is calculated using the number of Thomson ISI WOS indexed publications attributed to an author over the past six years. There is no grant income component for this index. As van Rann (2005, p.4) notes, the indexation of journal articles by ISI (and now Scopus), is far from uniform, with far fewer journals in the Social Sciences and Humanities being indexed compared to those in the hard sciences and medical fields. Further, problems such as an American bias within the WOS (Nederhof, 2005, p. 91), and the fact that the majority of conference proceedings, which can be the leading form of information...
dissemination within a number of research fields, are not indexed by ISI are also noted (Kerrmarrec, A., et. al., 2007, p.7). That said, the University recognises the influence of bibliometrics as a measure of research performance, as well as the trend within Australian Universities to focus upon publishing in ISI indexed journals (Butler, 2003b, p.147), and thus the ISI Socratic Index was introduced.

Research Input Points, known as RIPs, focus on competitive research grant funding, namely categories 1, 2, and 4 of the HERDC grants data collection. The following formula is used to determine the weighting of grants:

- 1 = grants less than $50,000
- 2 = grants $50,000 to $500,000
- 3 = grants greater than $500,000

As with publications, the grant score is then divided on a pro-rata basis amongst all the chief investigators.

The Research Output Points and the Research Input Points for each staff member are then summed to determine the Socratic Index. The Socratic Index is currently calculated using a six year window, from 2002-2007. For staff members who arrived at UWA after 1 January 2002, the individual’s points are calculated on a pro-rata basis, and the pro-rating is noted on their record.

Figure 1: Summary data provided for each staff member in Socrates

As well as summary data for each staff member, Socrates provides a view of their publications, grants and HDR load via a series of tabs.
Each tab available within Socrates provides more detailed information on a particular aspect of the staff member’s research performance. For example, the Publications Tab provides not only details of the publication imported from the publication database, but also citation data, including the most current impact factor for articles appearing in ISI Indexed journals.

Within the application, staff members can import their data into a preformatted CV Word Document, which lists their publications, grants and completed as well as current HDR students. Additionally, Socrates supplies data to its sister application, the UWA Research Staff Profiles website, which, as highlighted in Figure 3, provides staff and the public with details on UWA researchers, including research tags (see below for further details), their five latest publications and grants (with access to other publications and grants stored within Socrates), and a self-entered biographic statement.
Within Socrates, staff members are able to view their output and input performance over time, via the history tab, which charts their performance against their school/organisational unit average (see Figure 4). HR events, such as promotions are also highlighted within the charts.
The introduction of the Socratic Index allowed the University to comparatively view the research performance of its staff for the first time. In addition to providing an individual score for each researcher, Socrates was also able to produce averages for:

- The University
- Academic Levels
- Faculties
- Schools
- Research Groups

It should be noted that research groups are not a standard organisational unit within UWA. Rather, they are groupings created within Socrates for activities such as the RQF/ERA, or for analyses of particular fields of research that tend to be multidisciplinary in their nature.
Within figure 5, the bars illustrate the overall University average Socratic Index, Faculty average Socratic Index, School average Socratic Index, and the average University Socratic Index of the academic level of the individual. The table of data details the individual research performance measures for the individual. The points system can be changed to incorporate University Research Output Points, Government Research Output Points and Thomson ISI Research Output Points.

In an effort to protect the privacy of individual research staff, Socrates has been designed with a number of differential access levels. Individual researchers can see their own detailed record as well as all average figures. Heads of School can see all the detailed results of their school members, as well as all averages. The same privileges exist for Deans at a faculty level, while members of the University Executive, the University’s Tenure and Promotions Committee and a small number of central administrative staff have access to all records.

One of the main benefits in establishing a Socratic Index in the lead-up to the RQF was that when it came time to form research groups, it became very easy to see how the addition or subtraction of an individual would influence the productivity level of a research group. Currently, this functionality is no longer as important in light of the ERA’s focus away from actual research groups, in favour of the performance of a university in particular research
areas. However, it is very useful in determining the impact of individuals within both traditional organisational groups, and multi-disciplinary research groups created with Socrates for analysis purposes, and it remains a key tool for the Executive in determining the research strengths and priorities of the University.

**Determining Areas of Research Strength and Weakness at UWA**

Much of the literature devoted to measurement of R&D focuses on bibliometric data at a field of research level. Numerous scholars have described the difficulty in mapping the disciplinary fields of research groups and then measuring a group’s performance (see Bourke, & Butler, 1998). By introducing a measurement, based on each individual’s performance, Socrates has managed to bypass many of the difficulties involved in measuring R&D performance. However, to gain a complete understanding of the University’s research performance, it is important that we are able to view not just the performance of individuals, but the performance of the University within specific, especially, multi-disciplinary areas.

When formulating research groups or attempting to determine the University’s research activity in particular fields of study, Socrates is able to group together researchers from across the University, by utilising a series of research tags. Tags are generated from a variety of data sources, namely, RFCD/FOR codes used to classify both publications in the UWA Publications Database, and research grants used in the UWA research grants database, Info-Ed. Additionally, subject fields are imported along with citation data for publications indexed in TISI’s WOS. Finally, staff can self-nominate their research interests both within the UWA Research Expertise Database and their public profile in Socrates.

The ability to use research tags to identify staff in broad multi-disciplinary areas of research then makes identifying areas of research strength and weakness far simpler than previously, when individual databases would have to be searched, with results cross checked before staff working in multidisciplinary groups could be accurately identified. Naturally, the Socrates method is not infallible, as it relies significantly upon the data within our own systems, which is not always reliable. We have a particular issue with the RFCD classification of publications, as publications are entered into the database by administrative staff at an organisational unit level. We have found that often, even for large organisational units with staff working in a variety of fields, the broadest form of classification is used for all publications. That said, by combining multiple sources of research tags, we are still able to gain a fairly accurate view of our research performance at the disciplinary base level.

**Changing Behaviour**

Feng et al. (2004, pp. 181-191) argue that in order to develop a systematic approach to improving R&D within a university, a meaningful measure must first be introduced to all for the charting of R&D performance over time and to be able to evaluate the effectiveness of policies introduced to strengthen R&D performance. With the launch of Socrates, it soon became apparent that UWA had developed an important tool for research quality
management, which served a purpose far beyond the organisation of the University’s submissions for the RQF/ERA. Socrates is an application allows for not only the identification of strong and weak performing areas of research, but will also prove useful in charting the effectiveness of central policies relating to research upon the behaviour of research staff.

The ability to compare the research productivity of staff is highly valuable. The University has been able to properly gauge areas of strength and weakness in its research performance, and identify research groups working well together. This is particularly useful when nominating groups for schemes such as the ARC Centres of Excellence Programme.

Equally important is the fact that the University was for the first time able to conclusively verify a number of assumptions. For example, as is illustrated in Figure 6, Socrates shows that, at the University level, the productivity of staff members increases greater than linearly with their academic role level. Whilst we had always expected that staff at higher levels of the academic scale were more productive than less senior staff, Socrates allowed us to chart the differences in performance by level. Figure 6 demonstrates that all 3 measures of the Socratic Index (University, Government and TISI) increase greater than linearly with academic role level. It should be noted that the same results are also clear at the faculty level.

Figure 6: Research performance as measured by the average Socratic Index Scores by academic role level*

* LVLA = Associate Lecturer, LVLB = Lecturer, LVLC = Senior Lecturer, LVLD = Associate Professor, LVLE = Professor.
In addition to being able to calculate an average performance metric for each academic level, we are now easily able to chart the patterns of publication, grant applications and grant successes across the University, down to the individual researcher level. When it came to charting grant applications, as expected, there were significantly higher levels of activity in high cost research areas as opposed to low cost areas. For low cost research areas, which include, the Humanities, Social Sciences, Law, Business, Education and Architecture, the mean RIP was 1.38, while for high cost areas, which include, Engineering, Medical Sciences, Natural and Physical Sciences, the mean RIP was 4.20.

In addition to the information the system provides to the Executive and administrators focusing upon research performance, Socrates has also proven to be a significant tool when assessing applications for promotion and tenure. The application is used by the Promotions and Tenure Committee to chart the productivity levels of staff members and to determine their patterns of publication behaviour. Further, anecdotal evidence suggests that individuals have begun to hold off on promotion until they exceed the average for their current level, and begin to perform at a level more consistent with the next step of the academic ladder. Younger staff members have expressed satisfaction at having a gauge by which they can measure themselves, and many consider the average SI score for their level as the minimum score they should be aiming for. Fundamentally, it is felt that Socrates has played an important role in clarifying for staff members the requirements of the University in terms of their research activity.

The introduction of the TISI Socratic Index, which provides publication points only for publications published in an ISI indexed journal, has lead to a change in publication behaviour. Staff members are now more aware of the influence of citation data, and understand that, as the University strives to improve its position in the Shanghai Jiao Tong Ranking (Liu & Cheng, 2005, pp. 1-7), a greater importance is now placed on journal articles indexed by ISI. The number of C1 journal articles published by UWA staff members that are indexed by ISI has increased by 10.19 percent from 1561 in 2006, to 1720 in 2007. This is a significant increase in UWA’s publication rate in ISI index, as it almost equals the combined improvement rate for the previous three years.

<table>
<thead>
<tr>
<th>Year</th>
<th>publications</th>
<th>Percentage Increase</th>
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<tbody>
<tr>
<td>2003</td>
<td>1406</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>1463</td>
<td>104.05</td>
</tr>
<tr>
<td>2005</td>
<td>1469</td>
<td>100.41</td>
</tr>
<tr>
<td>2006</td>
<td>1561</td>
<td>106.26</td>
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<tr>
<td>2007</td>
<td>1720</td>
<td>110.19</td>
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It is still too soon to measure the impact of Socrates on Grant application behaviour. Further, UWA has introduced a series of reforms over the last five years to improve grant application
and success rates, it may be somewhat more difficult to determine the influence that Socrates alone has over any improvement in this area.

**Looking forward**
Feng et al. (2004, p. 182) claim that ‘the key factor which will bring out an increase in strength (in R&D activities) is the efficient management of R&D activities’ Socrates plays a significant role in managing research quality activities, in part due to its adaptability. When the University decides to implement policies to improve its research performance, Socratic Index formulas in Socrates can be recalculated to take into account the aims of the University. In this way, not only can the University Executive gain an understanding of its strengths and weaknesses in regards to its new aims, but staff can quickly begin to change their behaviour accordingly.

It is hoped that in the future Socrates will also have a significant role to play in highlighting not only the level of research productivity and performance amongst UWA staff members, but will also be able to chart their teaching duties as well. Currently, as part of its examination of research productivity, Socrates charts the Higher Degree by Research (HDR) FTE supervision load for supervisors. Also provided are figures on HDR completions for staff, completions times, and average completion times by various groupings. Ultimately, Socrates should be able to provide details on the number of units for which a staff member serves as course controller; the number of units they are involved in teaching per semester; their total number of lectures each semester; their total number of tutorials each semester; student satisfaction survey results and so on. Such measures will also be useful in charting the University’s progression in University rankings that take factors beyond research performance into consideration (see Brookes, 2005, pp. 1-22). Additionally, university committee service will also be recognised by Socrates, thereby allowing the Promotions and Tenure Committee with a more complete view of a staff member’s teaching, research and community service work.

**Conclusion**
The introduction of Socrates to the research community of UWA has lead to a significant change not only in the way in which individuals view their research performance, but in the way the University views research productivity at UWA. Socrates has proven to be an effective tool not only for the measurement of research performance at the individual and group level, but it will also prove particularly useful in the long term as an application by which to chart the impact of research policy decisions upon the behaviour of researchers.
References


