The effect of scholarly communication practices on engagement with open access: An Australian study of three disciplines

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Danny A Kingsley

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This thesis contains no material that has been accepted for the award of any other degree or diploma in any university. To the best of the author's knowledge and belief it contains no material previously published or written by another person, except where due reference is made in the text.

Danny A Kingsley
December 2008

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Abstract

This dissertation addresses a specific aspect of the broad area of communication systems used among researchers. This research has undertaken to establish a broader view of the communication practices of scholars to understand the motivations behind their publication choices. Open access offers a solution to issues with the scholarly publication system such as delays in publication and restricted visibility of research due to high subscription costs. The principle of open access is to enable maximum access to findings from publicly funded research to maximise social returns on public investments. Despite the apparent benefits of open access, the uptake has been limited.

This thesis research takes a holistic view of the researcher as a communicator to uncover the reasons *why* researchers are making the publishing decisions they are. In-depth interviews were conducted with 43 researchers in three disciplines at two institutions, the Australian National University and the University of New South Wales. The disciplines, Chemistry, Sociology and Computer Science, were known to have different publication practices, The questions asked about all aspects of researcher communication including researching, authoring, informal communication, article submission, refereeing, mentoring and data storage.

The findings show that traditional arguments for open access are ineffective. The Reward function of scholarly publishing is central to managing academic careers and supports traditional publishing systems. While having work openly accessible increases an academic's exposure and possibly therefore their citation counts, unless alternative internet-based forms of metrics are adopted, the open access option will not directly appeal to researchers.

Information-seeking behaviour demonstrates how disciplinary differences affect researcher's interaction with technology. The disciplines showed marked differences in almost all the areas explored, and the behavioural norms expressed in each discipline have direct bearing on the likelihood of members of that discipline embracing open access. The 'institutional/disciplinary divide' means that researchers must publish in ways that run counter to their disciplinary norms in order to satisfy institutional and grant funding requirements.

Until governments, and particularly university administrations, recognise the need to consider the discipline and the need to consider the individual and respond to these needs, and until there is a realisation that different disciplines may require radically different approaches, there will not be a large-scale adoption by individual researchers of the current open access tools. Either institutional repositories need to adapt dramatically to offer work practice benefits or the broader academic population will only use institutional repositories under duress, which is not the situation envisaged by open access advocates. The alternative is for communities to develop their own subject-based repositories, a development that again is likely to be highly dependent on communication norms in different disciplines.

Glossary of Abbreviations

AAP	American Association of Publishers
ACM	Association of Computing Machinery
ACS	American Chemical Society
ADFA	Australian Defence Force Academy
ANDS	Australian National Data Service
ANU	Australian National University
APAC	Australian Partnership for Advanced Computing
APSR	Australian Partnership for Sustainable Repositories
ARC	Australian Research Council
ATN	Australian Technology Network
BMJ	British Medical Journal
CEDAM	Centre for Educational Development and Academic Methods
CoRR	Computer Research Repositories
CSIRO	Commonwealth Science and Industry Research Organisation
CUL	Cornell University Libraries
DEST	Department of Education Science and Training
DOAJ	Directory of Open Access Journals
ERA	Excellence in Research Assessment
ESCE	Electrical, Computer and Systems Engineering
HERDC	Higher Education Research Data Collection
IDEAS	Internet Documents in Economics Access Service
IRU	Innovation Research Universities
ISI	Institute of Scientific Information
JAMA	Journal of the American Medical Association
JCR	Journal Citation Reports
MIT	Massachusetts Institute of Technology
NGU	New Generation Universities
NHMRC	National Health and Medical Research Council
NIH	National Institutes of Health
NSF	National Science Foundation
OAK Law	Open Access to Knowledge Law
OECD	Organisation for Economic Co-operation and Development
OJS	Open Journal Systems

OpenDOAR	Open Directory of Open Access Repositories
PNAS	Proceedings of the National Academy of Sciences
PRF	Petroleum Research Fund
PRISM	Partnership for Research Integrity in Science
QUT	Queensland University of Technology
RAE	Research Assessment Exercise
RCUK	Research Councils UK
RePEc	Research Papers in Economics
ROAR	Registry of Open Access Repositories
RQF	Research Quality Framework
SC	Scholarly Communication
SCI	Science Citation Index
SIGMOD	Special Interest Group in Management of Data
SPARC	Scholarly Publishers Association Resource Coalition
STM	Science, Technical and Medical
UK	United Kingdom
UNSW	University of New South Wales
USA	United States of America

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Chapter 1 – Introduction

Scholarly communication and the Internet

Scholarly communication systems are in a period of transition. Although the systems in many disciplines have maintained an adherence to the journal publication process that has been in place in academia for long periods, evolving technologies have allowed new forms of communication to develop, and have offered alternative publishing options for researchers looking to new ways of sharing their research findings.

In the same way that the new technology of the printing press revolutionised the distribution of text, the advent of the computer in modern times has completely altered the way people work and communicate. The printing press resulted in a period of great change. Indeed, “the shift from script to print preceded a transformation of world views” (Eisenstein, 1979, p. 459). The technology itself was not the changing factor, however, because there needed to be a period of development of the social and human side of the endeavour to allow the technology to be used as a way of assisting change. Prior to the printed word, information resided in a 'collective memory' - transmitted by word of mouth and by transcribed manuscripts. These methods were unable to make the information 'public' in its complete form, a situation that was altered when printing emerged (Eisenstein, 1979).

There have been many parallels made between scholarly journals emerging from the invention of the printing press and the advent of the Internet leading to new scholarly communication processes. However, this phase of change is only beginning. It took more than two centuries after the invention of the printing press before the emergence of the first scholarly journal, *Journal des Sçavans*, shortly followed by the first scientific journal, the *Philosophical Transactions* of the Royal Society, in 1665.

Printing was only possible due to the prior invention of paper (Febvre & Martin, 1976), and similarly the development of computing provided the infrastructure which allowed the Internet to be built. Since the 1960’s, computing technology has doubled its performance per unit of silicon area every 18 months, a phenomenon known as Moore’s Law (Bacon, 2006). When considering the impact of the Internet on scholarly communication, the analogy with the invention of the printing press leading to scholarly

journals indicates we are currently in the developmental period between the two. Eisenstein is at pains to explain that other forms of printing (of scientific results for example) were in circulation well before journals began to be distributed. In the same way, academia, governments and publishers are currently experimenting with different ways to use the new technologies.

If scholarly communication were designed now, "equipped with the World Wide Web, computers in every laboratory or institution and a global view of the scientific research effort" it would take on a very different form to the cumbersome system we have inherited (Swan, 2007)[1]. Today's scholarly communication system still reflects the very early journal publication system, with adaptations that have accumulated over the years. Scholars still undertake their research, write their papers, and send them in for assessment. Once reviewed, these papers are published in compendiums of journals or conference papers whereupon they are (sometimes) sourced and read by other researchers. The only true concession to the revolution of the Internet is that papers are now available online, but they are still 'papers' in the sense that they are formatted for printing, and often paginated. There has yet to be a widespread embrace of the possibilities and changes offered by new technologies.

Technology is a driver of change and the Internet is a technology that offers possibly unprecedented opportunity for change. The Internet moved from being a restricted-access network to a widely available network between 1990 and 1995 (Clarke, 2004). While some academic groups were using early Internet tools such as email and Usenet, the Internet did not become publicly accessible until the development of the World Wide Web in 1991 and the subsequent release of Mozilla in 1994 (which became Netscape in 1995). The Internet in the intervening 13 years has transformed the way a significant proportion of the population, at least in first world countries, conduct their working and social lives. To the libraries and some researchers, the Internet was seen as an agent of change – a way of accessing content at the work-desk, and of avoiding library shelves groaning under the weight of unread bound journals. In addition the Internet offered new indexing systems that could provide a more streamlined access to the burgeoning amount of literature now available. Stevan Harnad was an early, and continues to be a tireless, campaigner for

[1] Many of the references in this thesis are to electronic-only sources (such as this one). When possible I have included a section number for direct quotes, but often there is no way of indicating where in the text the quote came from. If I have given a direct quote without a page reference, this is why.

change to scholarly communication. He first came to prominence in this field with his 'subversive proposal', suggesting a radically decentralised scholarly publishing model, in which scholars self-publish their works, which then may or may not be peer reviewed (Brent, 1995). However academics did not take up these calls for change. Instead, publishers began to present journals electronically, changed their subscription structure and continued to make large profits (Kingsley, 1995).

The open access concept grew out of these early debates, and it is here that this thesis begins its story. The rationale behind opening access to research outputs is fundamentally an issue of fairness. It addresses a broad criticism of the current scholarly publication system: that academic articles are written by the academic community, peer reviewed by the academic community and often edited by the academic community, with no compensation, yet the high subscription costs of commercially published research are a barrier to the effective dissemination of knowledge. In addition, open access offers the potential benefit of:

> … enhanced access to, and greater use of, research findings, which would, in turn, increase the efficiency of R&D as it builds on previous research. There is also significant potential for open access to expand the use and application of research findings to a much wider range of users, well beyond the core research institutions that have had access to the subscription-based literature (Houghton, Steele, & Sheehan, 2006, p. vi).

Many authors have stated that there are functional issues with scholarly publishing as it stands, such as the delay between submitting a paper and the paper eventually being published, the problem of data management, and the assessment of research. These problems are discussed in Chapter 2. They could be addressed by a different approach to technology in this arena. While these are not new problems, new technologies may mean the solutions to these questions are within reach. In the words of the Budapest Open Access initiative (2002): "An old tradition and a new technology have converged to make possible an unprecedented public good".

Scholarly communication and open access

Open access generally refers to the dissemination of research in a way that is freely available to any interested reader with an Internet connection. This is achievable in several ways, such as through an open access online journal, as an open access article within a proprietary journal, or by placing a copy of the work online in a digital repository developed either by an institution, a scholarly association or a multi-disciplinary group.

Empirical evidence suggests that the academic community supports the idea of open access, with figures indicating that over 80% of researchers would deposit their work online if they were required to (Swan & Brown, 2005). Despite this finding, and many other studies indicating a willingness to engage with open access dissemination options, the actual numbers of articles available in an open access format show that these expressed attitudes and willingness have not resulted in action on behalf of the academic community. Approximately 10% of all journals appear to be open access journals (Lund University Libraries, 2008). Recently several publishers have offered alternative open access options, such as the ability to pay for open access publication within selected proprietary journals, and while details on the uptake levels of these options are scarce, early indications are that approximately 10% of articles are being published as open access in these hybrid journals (Suber, 2006).

Generally, digital repositories providing open access to articles appear to have a deposit rate of about 15% of all articles published (Sale, 2005b), although a recent study found 11.3% of articles published in 2006 had a usable copy in a repository (Bjork, Roosr, & Lauri, 2008). This low deposit rate is particularly marked in repositories that have been developed by, and are operated by, institutions such as universities and public research organisations. These figures suggest there is an inconsistency between the findings of several substantial attitudinal studies towards open access and the reality of the uptake of open access dissemination options.

In response to this situation Harnad has more recently turned his attention to the benefits of author deposit in repositories and has written extensively advocating policies and mandates for the use of institutional repositories (Harnad, 2003, 2005; Harnad et al., 2004a). These arguments are part of what is now an international open access archiving movement, discussed in depth in Chapter 3.

Early calls for the adoption of open access dissemination (Max Planck Institute, 2003; Open Society Institute, 2002) have been met around the world with mandates by funding bodies (National Institutes of Health, 2005; Research Councils UK, 2005a; Wellcome Trust, 2004b), at a government level (UK House of Commons Science and Technology Committee, 2004b), and by the Organisation for Economic Co-operation and Development (OECD) which released a report stating: "The principle is to enable maximum access to findings from publicly funded research to maximise social returns on public investments" (Houghton & Vickery, 2005).

In Australia, where the research reported on in this thesis was undertaken, there has been considerable support for open access at a government level, (Australian Government Department of Education Science and Training, 2007) with requirements for universities to develop institutional repositories (Harvey, 2008), and the two main funding bodies requesting researchers to place versions of their findings into repositories (Australian Research Council, 2007a; National Health and Medical Research Council, 2007). In addition, a much anticipated report on innovation in Australia recommended (among other things) that: "… a specific strategy for ensuring the scientific knowledge produced in Australia is placed in machine searchable repositories be developed and implemented using public funding agencies and universities as drivers" (Cutler, 2008, p.20). However despite this apparently widespread support for open access at government, funding and institutional levels, the Australian academic population mirrors the low engagement with open access that is displayed world-wide.

This thesis examines this inconsistency between support for open access at the government and institutional level combined with the proclaimed support demonstrated by research into the academic population, and the reality of the low uptake of open access dissemination options. In broad terms it seeks to explore the barriers to the uptake of open access scholarly communication in Australia.

Several large studies have been undertaken to ascertain authors' attitudes towards open access (J. Allen, 2005; Pelizzari, 2003; Rowlands, Nicholas, & Huntington, 2004b, 2006 #775; Swan & Brown, 2003, 2004 #94; 2005), which are discussed in depth in Chapter 3. These have generally been Internet surveys addressing 'what' questions such as: 'what are people's attitudes?' and 'what are they doing about publishing?' In addition, these surveys have often also incorporated a predictive element such as 'what would be the response to certain circumstances?'.

Questions which have not been addressed in these studies include: 'why are researchers not engaging with open access?' and 'why are researchers choosing to support traditional publishing systems when technology offers an efficient and more immediate way of achieving the functions of the system?' One clue could reside in history, at the time of the advent of the printing press. Now, as then, the new technology is itself not the changing factor. Scholars are currently in a similar period of development to that experienced with printing, and the social and human side of changes to scholarly communication need to be addressed to allow the technology to be used to assist change.

This research began with three premises drawn from the literature, which is described in Chapters 2 and 3. The first premise was that the general lack of awareness of open access in the academic population is only a small factor in the population's low engagement. The second premise was that the reward system in academia is a considerable part of the reason why open access is not being adopted as quickly as some advocates would like. The third premise was that an important element in the uptake of open access is the individual researcher. To that end, it appeared unlikely that much information would be gained from direct questions about open access. This work thus began with the assumption that open access itself is not the central issue, rather, it is broader issues with the scholarly publication system that are preventing engagement with open access. In order to address these premises, the research question of this thesis is:

How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?

This thesis therefore moves beyond the 'what' questions. It is evident that the concept of open access is not resonating with academic communities. By establishing what the barriers to open access are, this thesis sets out to answer 'why'?

Actors in the scholarly communication system

It appears likely the scholarly communication system will change and there is a danger that without considered discussion and debate amongst all of the groups of actors entangled in it, the system will end up with more problems than it has now. What ultimately happens will be more than partly determined by the activities and decisions made today. The changes currently being developed and adopted are largely the result of the agendas of some interested players rather than what will actually be of most benefit to the communication of information. It is instructive to look at those groups and their position in the scholarly publication system. This research focuses primarily on the academic population as they are the generators, and main users, of published academic literature. They are not, however, the only group affected by a potential move to open access. Scholarly publishing is a large and complex system, worth billions of dollars annually, and embraces many interested parties.

Any change to scholarly communication systems will affect all of these groups of actors. Open access is a relatively new concept, and introducing this idea to the various players in the debate can be described in terms of the adoption of an innovation. This will be

examined more closely in this thesis. Open access affects the whole communication system, but it affects each section of that system differently. While the main focus of the thesis remains on how open publishing has an impact on the academic population, the literature review also incorporates a brief examination of how these groups are shaping the form of open access dissemination options, and how open access affects them.

Scholarly publishers

Important among these actors are scholarly publishers, who acquire the copyright, reproduce the articles or express them in reproducible form, and enable controlled discovery of and access to the information - the commodity being traded in this system.

Open access poses an economic challenge to commercial publishers who make commercial decisions, such as gauging how much the market can bear in terms of subscription prices, and deciding the granularity of the offerings they make available for purchase, in particular the bundles of journals and associated services. Many publishers acquire the copyright of published academic work as a condition of accepting the article for publication. One way of meeting the challenge of change has been the globalisation of scholarly publishing, with the smaller, independent and society publishers being amalgamated into a few large publishing firms. This is particularly marked in the STM market: "Combined, the four leaders represent 49% of the market. Market leader Elsevier serves one-quarter of the market. The top 15 players, including publicly listed, private and non-profit providers, combine for about US$6.0bn, or 78% of the total" (Worlock, 2004, p. 292). This trend is accentuating, with a 2006 analysis stating that the top 11 publishers were producing more than 70% of journals in scientific publishing at the time (Ware, 2006). The influence of publishers will be discussed in Chapter 2.

Libraries

Libraries, particularly those within universities and other research organisations, also have a financial stake in the open access debate. Librarians were one of the first groups affected by problems in the scholarly communication process. They have known for decades that the situation could not continue as is. Documented dissatisfaction with the scholarly publishing system dates back nearly a century, but the current debate began in the late 1980s with what was described at the time as a 'serials crisis'. This arose from the combination of two factors: first, the number of scientific papers published annually has been doubling every 10-15 years for two centuries (Odlyzko, 1996) and second, journal subscription prices rose 110% between 1985 and 1993 (Stix, 1994). These increases in subscription prices have been far higher than inflation(King & Tenopir, 2000). Institutional libraries, as the brokers between researchers and publishers, realised the

situation was not sustainable and began agitating for change. To librarians, the introduction of electronic journals then, and open access now, offers a way of fulfilling their role as information brokers without the difficulty of escalating costs. Libraries worldwide have been working on alternatives to the scholarly publication system, including developing and taking responsibility for digital repositories.

Funding bodies

The actors also include those who fund research, such as governments and funding bodies, the administrative arms of institutions housing researchers, conference organisers, scholarly societies, institutional libraries, and the general public, whose taxes pay for research. As mentioned above, in Australia almost all research is publicly funded and bound by various funding rules.

Individual researchers

This research focuses on individual researchers, who, unlike governments, institutions, publishers and libraries, do not necessarily perceive the big picture in scholarly communication, primarily because there is no need for them to do so. They have remained largely buffered from the serials crisis as they are not responsible for the serials acquisition budget. In many ways researchers sit outside the open access debate which is primarily occurring amongst publishers, librarians and at government level. This thesis postulates that the individual researcher is the key to the uptake or otherwise of open access dissemination options, and has been largely absent from consideration in the development and implementation of repositories into universities in Australia.

Academic researchers are not a homogenous group. They have their own areas of research, their own ways of communicating with one another and their own publication venues. While some research operates on very short timeframes, such as in computing, other research takes years. The speed of information production and reticulation is likely to be an important factor in the perception of the necessity and urgency for change amongst the participants. Many tools are available to support reticulation of information on the Internet, and more continue to emerge. Which of these will be used in future scholarly communication systems is yet to be determined. Those that are prevalent now may not be the primary form of communication even within the next 10 to 20 years. This thesis examines the present, and while taking a serious and considered assessment of the situation, it is limited by its circumstances to a snapshot of a period in the process of change.

The research described in this thesis has therefore asked researchers in three different disciplines individually about their research and writing practices in order to establish why they are making the decisions they are about publication. An interview technique was employed rather than using questionnaire-based surveys about their attitudes. The research intends to reveal whether the lack of engagement with open access has a common element across different academic groups, within particular academic groups, or if it is an individual decision.

This thesis commences by taking a broad view of the scholarly communication system and how scholarly publishing fits into the system. Chapter 2 explores the challenges facing the scholarly communication system as the technology supporting it changes, and discusses how open access can address many of these challenges. Chapter 3 details how open access is achieved before discussing the type of research to date that has been conducted about the level of researcher engagement with these options, noting that to date that there has been little attention focused on why these levels are low. In Chapter 4 the research design for the empirical aspect of the work is outlined. Chapter 5 describes the results of the empirical work focusing on scholarly communication, and Chapter 6 discusses the results in relation to academic careers. Chapter 7 is a description of the triangulation of the empirical work in terms of the diffusion of innovations, and incorporates the master/apprentice aspect of the results. Chapter 8 explores the broader implications of the results in terms of disciplinary differences and information seeking behaviour and how these are central to the adoption of institutional repositories. A conclusion to the work is provided in Chapter 9. By taking a holistic view of the communication practices between scientists, this thesis aims to illuminate possible future pathways for scholarly communication systems.

Chapter 2 –
Arguments for open access

Introduction

In order to answer the question "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?" it is necessary to adopt a holistic view of the communication practices of scholars, in particular the motivations behind the publication choices they are making. Broadly, the research question relates to scholarly publication and how it fits within the wider scholarly communication landscape. This thesis is looking at a specific area of scholarly communication, and will not attempt to address the entire scholarly communication landscape, however a comprehensive background chapter is required to fully encompass the wider vested interests, financial and otherwise in any change to the scholarly communication system.

This chapter will begin with a discussion of the scholarly communication system, looking at the integral role journals play in the system and how researchers engage with the system. The economics of scholarly publishing is briefly discussed, including how this has changed with a move to electronic publishing, and the level of awareness researchers have of the economic imperatives. The concept of open access is then introduced. The remainder of the chapter is a discussion of the five functions of scholarly journals, Awareness, Certification, Reward, Archiving and Registration, how each of these functions are being affected by difficulties with the current scholarly publishing system, and whether open access offers a solution to these difficulties. The issue of copyright is also briefly discussed in this context. The bulk of the literature on this topic focuses on scientific, technical and medical publishing, and while the scope of this research is wider, the literature review reflects the available literature.

The scholarly communication system

The formal scientific communication process has been described in terms of four functions: Registration (of the author's claim for priority), Awareness (of the publication), Certification (a result of peer review) and Archive (long term retention of the material) (Roosendaal & Geurts, 1997). Van de Sompel (2004) proposed the fifth function of Reward for promotion and appointments. A sixth function has been recently added to the mix, that

of Navigation, “providing filters and signposts to relevant work amid the huge volume of published material” (Ware, 2006, p. 5), but I will not be exploring this function.

The publishing aspect of the scholarly communication system has in many ways changed little in the centuries since the first scientific journal. Researchers write up their work into an article, conference paper or book, submit it to the publication outlet of choice, whereupon it is sent out to other researchers in the field for review. If the work is deemed original and valid research, it is published, and therefore available for the remainder of the scholarly community to read. However, this simple summary glosses over many of the difficulties in the system today, and these issues are the focus of this chapter. It should be noted that while much of the material in this chapter is discussing journal articles, this is a reflection of the available literature rather than a conscious effort to restrict the discussion to the journal article at the expense of other forms of scholarly publishing.

This thesis builds on a rich history of research which suggests it is time to change the scholarly communication system. The literature indicates there has been dissatisfaction with the journal system for decades. In 1960, for example, delays in publication, restrictions on article length with the necessary omission of relevant supporting data, high costs preventing full coverage of any field and the time 'wasted' on editing and reviewing were all perceived to be problems with the system (Phelps & Herlin, 1960). Decades later, the whole scientific communication system came under scrutiny: “It seems inevitable that people should automatically point to the scientific journal system itself as something in need of radical change” (Piternick, 1989, p. 260).

The suggestion that individual papers should replace journals as the primary unit of distribution was first made in the early 20th century with a suggestion for central depositories of background material (what we call grey literature today), which could be “mimeographed or otherwise duplicated and placed in certain repositories” (W. E. Allen, 1922). A 1933 proposal suggested replacing journals with an international publishing house, a ‘Scientific Information Institute’, to take over all existing scientific publishing and bibliography, where authors would submit to the centre. A variation on this theme was the idea of a central editorial bureau of scientific experts to review, correct, edit and verify papers (Phelps & Herlin, 1960). However these authors concluded that the case for replacing the scientific periodical with a centrally controlled system of separates was not proved. That said, there is evidence to show that the articles people are reading are increasingly sourced as individual articles rather than as part of a journal. The journal’s importance in scholarship (to the reader) is decreasing:

> With evolution toward advanced systems, scientists seem to browse journals less often and spend more time searching online. It may be that scientists move away from traditional browsing of journals as electronic access to secondary databases and to aggregated full texts becomes more ubiquitous (Tenopir et al., 2003).

The electronic era has allowed for a myriad of new possibilities. Odlyzko proposed in 1996 that electronic journals could exist as collections of unpackaged but potentially refereed documents in a central server (Odlyzko, 1996). The inspiration for this was Paul Ginsparg's working article server at Los Alamos called arXiv [i], which began in 1991, and is now run from Cornell University. This was followed by the prediction of an "universal, Internet-based, bibliographic and citation database" (R. Cameron, 1997). The concept of an 'electronic aggregator' was put forward in 1999, consisting of a collection of self–published papers (Kling & McKim, 1999).

Current complaints about journals do not differ significantly from those raised in 1960. What has happened since that time is the advent of computers and the Internet, offering unprecedented opportunity for change.

Journals and the scholarly communication system

Scholarly publication used to be synonymous with scholarly communication, but this is no longer the case. Over the past 400 years, the publishing function of journals has shifted from a method of communication to a career tool. The emphasis has moved from Awareness and (to a lesser extent) Certification, to Registration and Reward: "the fundamental purpose of the journal has changed. In no small measure, scholarly communication has changed to become publishing" (Peek, 1996, p. 5).

The separation of the scholarly journal from the scholarly communication system is evidenced by the increasing use of journals as a career tool. Few (if any) science scholars use journal articles as a primary communication tool: "Scientific information is exchanged in a multi-tiered manner, and those myriad other channels render the scientific manuscript optional, if not obsolete … Often the journal article, the bedrock of peer-reviewed scientific knowledge, is the last information source consulted" (Seringhaus & Gerstein, 2006).

Journals still provide a valuable service, according to some arguments, providing a stable archive of the literature and "[t]ogether, they serve the need of today's scientists for more

knowledge from a wider variety of sources" (Tenopir & King, 2001). In addition: "Journals have formed the basis for networks of scholars, for which the editor forms a focal point around which members of the editorial board, regular reviewers, contributors and readers orbit. Such networks of scholarship can be extremely important" (Houghton et al., 2006, p. 52).

This argument of 'community' centred around the journal has been raised by others: "A journal will, by virtue of its history, present purpose, and current editors, have a personality and a set of concerns that stake out a distinctive territory recognised by readers and authors" (Horton, 2003, p. 1512). Some argue that having a journal is central to the establishment of a new discipline (Paul & Matasar, 1993). However, scholarly communication embraces a much wider remit than simply journal publication.

Researchers and scholarly publishing

The academic researcher wears two hats, that of author and that of reader, and the scholarly communication system of journal publication means different things depending on the hat in question (Guedon, 2001). Journals are important to authors because the name, status and impact factor of a journal have implications for assessment, tenure and grant applications. In this context the journal fulfils the roles of Registration and Certification. Authors have specific requirements of the journal system: "they want the ability to target a very specific group of key readers … and they want the imprimatur of quality and integrity that a good peer-reviewed, high-impact title can offer, together with reasonable levels of publisher service" (Rowlands, Nicholas, & Huntington, 2004a, p. 273).

Readers, on the other hand, are not focused on journals, they are focused on articles. This situation creates problems as "researchers as authors want to publish more, while as readers they want to read less" (Mabe & Amin, 2002, pp. 150-151). To a reader of an article, the only factor is the quality of the content, which is partly verified by peer review, and the journal name (or brand, to use a marketing term). This concept of the prestige or 'brand' of the journal does not guarantee high quality articles. It exists, "simply because in the past [the journal] has served as a meeting place where able scholars have coordinated their efforts and libraries their purchases" (T. Bergstrom, 2001, p. 12).

Scholarly communication, and the subset activity of scholarly publishing is central to this research, which is looking at the communication practices of researchers. It is necessary to understand the changing nature of scholarly communication as technology changes the way research is communicated and administered.

Research is a public activity, with 'communism', an extended sense of common ownership of goods, an integral element of the scientific ethos: "The institutional conception of science as part of the public domain is linked with the imperative for communication of findings" (Merton, 1973, p. 274). This communication has traditionally been by writing and publishing academic articles. Merton stressed the 'universality' of science, that nobody should be excluded from the science process. In order for that to happen, "scientific knowledge must be common property as it otherwise has not optimised its value in the process" (Roosendaal, 2007, p. 2). However, this chapter will demonstrate that the scholarly communication system as it stands is restricting people's access to that knowledge, and therefore the fundamental basis of the activity of science is being hindered.

The economics of scholarly publishing

One of the main barriers that scholarly journals pose to the dissemination of knowledge is their subscription cost. Indeed it was their escalating costs that precipitated the 'serials crisis' decades ago. The subscription model fragments research information behind deals, copyright rules and formats, preventing simple searches for research (Terry, 2006). The economics of journal publishing fuels many of the arguments for change to the scholarly publishing system.

Science and therefore scientific publishing boomed after the 1950s, when commercial publishers became an ever-increasing presence in the market. In Economics alone, the count has increased from 120 journals in 1980, at the time evenly split between commercial and not-for-profit publications, to almost 300 in 2000, but with two-thirds owned by commercial publishers (C. Bergstrom & Bergstrom, 2001). Scientific, Technical and Medical (STM) publishing is a US$7 billion industry (Gooden, Owen, Simon, & Singlehurst, 2002; Worlock, 2004). In the past two decades, journal prices have increased faster than inflation. Since 1986 the average price of a journal has risen by 215%, while the number of journals purchased has fallen by only 5.1% indicating a huge increase in subscription budgets. The numbers are even greater when restricted to science. Between 1984 and 2002, the price of science journals increased by nearly 600% (bepress, 2005). The niche nature of the market and the rapid growth in the budgets of academic libraries have combined to make scientific publishing the fastest growing sub-sector of the media industry over the past 15 years (Gooden et al., 2002). These figures have fuelled a long-standing tension between publishers and libraries:

> The economics of scholarly journal publishing are incontrovertibly unsustainable. Taming price inflation is not enough. Unless we change the current model, academic libraries and universities will be unable to continue providing faculty, students, and staff with the access they require to the world's scholarship and knowledge. Scholars will be unable to make the results of their research widely available (University of California Academic Senate, 2004, p. 1).

However, while libraries have been aware of this issue for decades, individual scholars appear to be unaware of the problem and do not (or choose not to) see themselves as part of the problem (Jeon-Slaughter, Herkovic, & Keller, 2005). This observation was also made by the UK House of Commons Science and Technology Committee (2004b): "It is disappointing that many academics are content to ignore the significant difficulties faced by libraries. Until they start to see the provision of journals as, in part, their problem, the situation will not improve". Scholars are disassociated from the pricing structure of the communication system in which they partake.

Given this, it is not surprising that an international survey has found that authors of papers do not consider cost when they are choosing a journal to which to submit work: "In their role as authors … the price of the journal, hence its ultimate affordability, was perceived to be the least influential of the reasons they gave for publishing where they did" (Rowlands et al., 2004a). This study also found that the high level of contribution authors are making in preparing their papers and reviewing others for publication meant, "their perceptions of the costs needed to sustain the system are far lower than those of the publishers themselves" (Rowlands et al., 2004a). This lack of interest in the economics of scholarly publication has potential impact on scholarly careers.

While authors do not seem to take interest in the issue of journal subscription costs, these have a direct bearing on authors' need to ensure their work is visible, and therefore cited. It may seem counter-intuitive, but publishing in traditional journals may be an impediment to having work read by the largest number of people: "The main thing that academic authors want out of publishing is to reach an audience. The high prices charged by journal publishers are an obstacle to this" (Gasson, 2004). Increased subscription costs have a negative effect on readership, and this affects publishers' ability to maintain their journals' Awareness function.

The issue of the high cost of journal subscriptions and how this affects the dissemination of research is central to many arguments for a move to open access dissemination.

However, the lack of interest or comprehension of this situation by the research community directly impacts their willingness to engage with open access, the focus of this research.

Open access scholarly publishing

The open access concept has been debated for over a decade. Broadly advocating that peer-reviewed scholarly material should be freely available on the internet at the time of publication, the movement originally developed from a reaction to the scholarly 'serials crisis' of the 1990's when journal prices skyrocketed (Harnad, 2003).

Defining open access

There is some debate about what exactly constitutes open access, and there are numerous definitions, including the Budapest Declaration (Open Society Institute, 2002), the Berlin Declaration (Max Planck Institute, 2003), and the Bethesda Statement (2003). One of the simpler definitions is:

> Open access to scientific journal articles means online access without charge to readers or libraries. Committing to open access means dispensing with the financial, technical, and legal barriers that are designed to limit access to scientific research articles to paying customers. It means that, for the sake of accelerating research and sharing knowledge, publishers will recoup their costs from other sources (Suber, 2002).

Clarke (2007) also notes that "From a legal perspective, the term 'open access' implies that the consumer is not constrained by copyright or other laws from making such reproductions as are necessary to enable access in a form convenient to that consumer".

In order to ensure the broadest discussion of the literature on this topic, this work uses a broad definition of open access, which includes most of the ten 'flavours' of open access described by Willinsky (2006). One flavour of open access that causes some debate is delayed-access, where the articles are made freely available after an embargo period. Some commentators argue that this does not constitute open access, as for items to be truly open access they should be made available immediately (Clarke, 2007; Open Society Institute, 2002; Suber, 2007b). I class the delayed-access option as preferable to closed-access, but not within the spirit of most definitions of open access.

Without using a specific definition, I concur with Houghton (2006), that: "The key element of open access is that the material is made available freely and openly, without charge or usage restrictions, to anyone with internet access" (p. 5). In addition, open access is not

restricted to scholarly articles, but includes original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials and scholarly multimedia material (Max Planck Institute, 2003). That said, this work is concerned primarily with the scholarly article.

Open access is generally achieved in one of two ways, by the publisher of a journal making the articles freely available (in some cases the whole journal, in others specific articles from any given issues), or by the author making the article available online, on a website or in a digital repository. These two routes of open access will be discussed in depth in the next chapter.

Institutional, organisational and government support for open access

There are currently various programs providing wider access to published material, including PubMed Central, the Open Archives Initiative, and the Scholarly Publishing and Academic Resource Coalition (SPARC). PubMed Central[ii] was set up by the US National Institutes of Health and is a centralised digital library providing free access to the full text of all peer-reviewed life-science research articles. Publishers can place delays on their publications on the system, giving their subscribers exclusive access for up to a year before the information is freely available, an example of delayed-access. The Open Archives Initiative[iii] in Britain aims to create a global online archive of all published research.

SPARC[iv] was created in 1998 as part of the Association of Research Libraries in the USA. It aims to return 'science to scientists' by "encouraging scientists to create journals that directly compete with those thought to be overpriced; by giving confidence to scientists to create journals in new areas of inquiry; and by backing scientists who create web-based resources other than journals for their communities" (Tamber, Godlee, & Newmark, 2003). SPARC has created low priced journals in competition with commercial ones: "In most cases the commercial publisher's journal has been quickly eclipsed by the start-up" (Gasson, 2004). Generally, these initiatives are using open access principles.

While open access developed from a need to address the serials crisis, it is now seen more widely "as a way to improve public, educational, and political impact of research" (Willinsky, 2003). There has been "considerable interest in recent years, internationally and in Australia, amongst government agencies, universities and other organisations in 'open access' to the results of publicly-funded research, including data and research papers" (Australian Government Productivity Commission, 2007, p. 5.34). In January 2004

Australia was one of the 34 signatories to the OECD Declaration on Access to Research Data from Public Funding. The Declaration recognises:

> that an optimum international exchange of data, information and knowledge contributes decisively to the advancement of scientific research and innovation … [and] that open access to, and unrestricted use of, data promotes scientific progress and facilitates the training of researchers (OECD, 2004).

Since 2000, a substantial number of studies instigated at the government level (Australian Government Department of Education Science and Training, 2007; Australian Government Productivity Commission, 2007; UK House of Commons Science and Technology Committee, 2004b) and funding body level (Research Councils UK, 2005a; Wellcome Trust, 2003) have looked into the issue of access to scholarly literature. As mentioned above, there have been several open access declarations at an international level, and position statements at a funding level (National Health and Medical Research Council, 2007; National Institutes of Health, 2005; Research Councils UK, 2005b; Wellcome Trust, 2004b). Not all position statements have been in support of open access (Royal Society, 2005), although in this last case the position seems to have softened, which is discussed below.

Open access and public good

Many of these reports, declarations and statements have come to very similar conclusions. One aspect of the debate has been the economic issue. A report to the Australian government argued that the benefits of having public sector research openly accessible through repositories would be 51 times greater than the costs (Houghton et al., 2006). The report argues that benefits are more than just economic, expanding to issues of 'public good':

> Scientific publishing also plays an important role in making research more efficient … Dissemination of findings helps other researchers define their research work, minimises duplicative activities and may provide data which might otherwise have been collected again. Moreover as an evolving process of building on findings, rapid publication and dissemination help to accelerate the advancement of science and, thereby, economic development (Houghton & Vickery, 2005, p. 17).

The Wellcome Trust, after commissioning two substantial studies into the costs of scientific publishing (2003, 2004a) released a statement in support of open access which said in part that the organisation: "has a fundamental interest in ensuring that the

availability and accessibility of this material is not adversely affected by the copyright, marketing and distribution strategies used by publishers (whether commercial, not-for-profit or academic)", and that it "supports unrestricted access to the published output of research as a fundamental part of its charitable mission and a public benefit to be encouraged wherever possible" (Wellcome Trust, 2004b).

This international interest has sparked a considerable body of research, much of which is discussed in this thesis. One significant work is a book by Willinsky (2003) which makes the (substantial) case for open access, arguing that a move to open access is in the public good as it creates additional sources of public knowledge. This knowledge has been increasingly withheld behind spiralling subscription costs, a situation which is very serious in developing countries. In addition Willinsky argues that public access to scholarly publications, particularly in the areas of health and the environment, is grounded in the public's 'right to know' and results in an informed public and support for research.

Another public good argument is that by making work available, open access creates additional sources of public knowledge because it increases the likelihood of cross fertilisation of ideas – with new areas of research becoming possible (Swan, 2007; Velterop, 2008). For example, "text mining will enable new facts to be discovered that would not be possible by humans such as gene associations" (Terry, 2006).

This chapter will now turn to the five functions of scholarly journals, Registration, Awareness, Certification, Archiving and Reward and look at how each of these functions are being affected by difficulties with the current scholarly publishing system, and whether open access offers a solution to these difficulties.

Registration

Registration, establishing intellectual priority, is achieved within the traditional scholarly publishing system by publishing articles in journals. Digital repositories offer an alternative way of establishing intellectual priority. Placing pre-review articles, or post-prints into a repository identifies the author of the idea at the time of deposit. Digital repositories include metadata about the article including submission date.

The Registration function is not integral to the discussion in this thesis but is included here because it is essential to the individual scholar within the scholarly publication system.

Awareness

The function of Awareness is being compromised in the traditional scholarly publishing system in two ways. High subscription costs pose a barrier to the widespread dissemination of published work, and delays in the publication process create a barrier to the use of journals as a communication tool.

Subscription costs and Awareness

Bergstrom (2001) looking at the field of Ecology and extrapolating to Economics, Atmospheric Sciences, Mathematics, Neurobiology, and Physics, has undertaken substantive calculations to support his argument that the high charges of for-profit publishers are not reflected in their readership numbers. Indeed there may be a reverse correlation: "The six most-cited economics journals listed in the Social Science Citation Index are all non-profit journals and their library subscription prices average about US$180 per year. Only five of the twenty most-cited journals are owned by commercial publishers, and the average price of these five journals is about US$1660 per year" (p. 1). When considering these numbers, it is important to note that non-profit publishers do not have to pay tax for which rates can vary between 30-50%. Tenopir and King (2001) also argue that commercial journals have comparatively low circulations, with the median circulation for commercial publishers in 1995 being 1400 subscriptions (compared to 5,600 for society publishers). When the calculations are broken down by citation in the field of Economics, the value-for-money issue is even starker. The average price per page of the commercial journals is about six times as high, and the average price per citation is about sixteen times as high, as for the non-profit journals: "While the nonprofits (sic) are supplying most of the information used by economists, the commercial presses are absorbing the lion's share of library budgets" (T. Bergstrom, 2001, p. 4).

While scholars choose to ignore the realities of their choice to publish in commercial journals, they are potentially 'underselling' their research by restricting its distribution. Perhaps more critically, by not taking advantage of the benefits of having global open availability of research online, the scholarly communication system as it stands is slowing the progress of science (Uhlir, 2006).

Delays in publication and Awareness

Delays in publication mean that the ideas presented in an article are known to researchers in a scholarly field well before publication. In a time of instant messaging (for younger researchers), a 12 month-plus delay is interminable. Communication tools are being developed to take advantage of needs in the marketplace not being met by traditional

publishers (Esposito, 2004). These include email lists, deposited pre-prints, mailgroups, weblogs and other forms of modern communication. The availability of these tools raises a question, at least in the area of economics:

> … what does 'published' mean, exactly, for a paper that has already been downloaded thousands of times, whose summarized contents have been read by many more thousands …? Whatever the economics journals are doing, 'publishing' is hardly an accurate description (Deaton, 2006, p. 6)

The recent introduction of electronic communication methods has not altered the speed of publication for many disciplines since 1960, when "a committee of the American Association for the Advancement of Science … reported delays of one year from the time of acceptance of a paper to its appearance in print" (Phelps & Herlin, 1960, p. 61). This is a serious problem for fast-paced disciplines where the citation half-life can be as short as a year or two, making it imperative to publish as quickly as possible to avoid irrelevance (Miller, 2004). Publishing delays are exacerbated by the peer review process, discussed in the Certification section below.

Open access and Awareness

Considering the small size of the intended audience of a particular piece of work, it is not surprising that many scholarly papers are never cited. A core of approximately 2,000 journals now accounts for 95% of cited articles (Steele, Butler, & Kingsley, 2006). However, any potential audience is considerably greater if the information becomes openly accessible. There is substantial evidence to show that articles that are made freely available online have a far greater impact than those languishing behind toll barriers. Indeed there is an ongoing bibliography of all research into the relationship between impact and access (Hitchcock, 2006).

A study of the online availability and citation counts of 119,924 conference articles in Computer Science and related disciplines found "a clear correlation between the number of times an article is cited and the probability that the article is online … The mean number of citations to offline articles is 2.74, and the mean number of citations to online articles is 7.03, an increase of 157%" (S. Lawrence, 2001). Analysis of Physics articles from 1992-2001 showed open access to non-open access citation ratios of 2.5-5.8 (Brody et al., 2004). Hajjem et al. (2005) examined 10 disciplines from 1992-2003 and found when comparing open access and non open access articles in the same journal/year, the open access articles had consistently more citations, the advantage varying from 25%-250% by discipline and year. These and other studies postulate that when access to articles is

unrestricted authors are able to read them and cite them more easily. This is referred to as the 'open access effect'.

The 'increased visibility' argument puts forward these and other findings as an incentive for researchers to make their work available by publishing in open access journals or by depositing their work in repositories. However, arguments have emerged in later studies that there is more than a simple cause and effect between higher citation and open access:

> … claims that the citation rate ratio of papers openly available on the internet (via ArXiv or some other mechanism) vs those not available through those means is caused by the increased readership of the open articles … are somewhat overstated, especially for well funded disciplines with high barriers to entry (Kurtz et al., 2005).

These authors argue that there are several possible explanations for the higher citation rates for open access articles. One of the reasons for higher citations is simply because the article appears sooner, so it has primacy and longer time in the public eye. This is described as the 'early access' postulate. Obviously any advantage gained by an article being available early is mitigated as the percentage of open access articles available moves towards 100%.

Another possible reason for the higher citations is that the articles being made openly accessible are higher quality articles, referred to as the 'self-selection bias' (Kurtz et al., 2005). There is certainly evidence to show the self-selection bias exists. When profiling people who voluntarily self-deposit, it appears that some self-selection is occurring, with evidence to show that items deposited in repositories tend to be more recent and higher quality articles that have appeared in top journals (T. Bergstrom & Lavaty, 2007) It appears that "journals with a higher impact have a larger fraction of papers that can be found online at non-journal sites" (Wren, 2005, p. 3).

It is not surprising that it is the higher quality articles that are finding their way into repositories. This reflects what Willinsky (2006) describes as the 'vanity factor', where greater research impact is the economy of researchers:

> recognition of one's peers is the principal measure of one's contribution to a field of inquiry … the particular ego economy of being cited by name, and of being so closely identified with one's published work … is not entirely without other kinds of rewards, which follow on this recognition factor (p. 21).

There has been an attempt to explain more clearly the reason for the open access impact advantage. A study that specifically attempted to estimate the effect of 'early view' and 'quality bias' by comparing those papers published in specific journals which were available in the preprint server arXiv and those that were not, found that there was no sign of a general 'open access advantage' but did show that having papers in arXiv accelerates citation because papers are available earlier (Moed, 2007).

It is likely that the early access and self-selecting bias are only two of many explanations for the increased visibility advantage. One clue that this is a complex area is a study which found that articles that are open access on a journal's site have higher impact than articles that are made open access by other means such as deposit into a repository (Eysenbach, 2006). Interestingly, articles that have been made open access through deposit onto non-journal websites are as likely to have been published in an open access journal as a subscription journal, which means some authors are depositing articles into repositories that are already available as open access (Suber, 2005a). Clearly there is more work to be done in this area.

Making research openly accessible offers the individual scholar greater control over their own career by increasing the visibility, and therefore Awareness of their work. Open access potentially offers benefits to researchers. This would appear to be a considerable incentive for researchers to adopt open access dissemination options, however they do not appear to be doing so. This research is attempting to understand why.

Certification

As discussed above, the function of Awareness is being compromised in the traditional scholarly publishing system partly because delays in the publication process create a barrier to the use of journals as a communication tool. A large reason for these delays is the peer review process, Certification. Of the five functions of the journal discussed in this thesis, Certification is the only function journals play for both readers and authors. Peer review represents a third role for the scholar, that of reviewer. This role is effectively hidden, with most peer review occurring without recognition, but this does not mean that a considerable amount of time is not devoted to the task.

One of the reasons peer review is causing delays in publication is the increasing volume of literature being submitted to journals each year. For example the *Journal of the American Medical Association* (*JAMA)* had 6,000 major manuscripts submitted in 2005, a doubling since 2000 (McCook, 2006). *Nature* receives around 9,000 manuscripts a year which is

double that of 10 years ago (P. Lawrence, 2003). *Nature Cell Biology's* submissions are increasing by 10% each year; The *New England Journal of Medicine* received 5,000 submissions in 2005, and submissions increase 10% to 15% each year (McCook, 2006). This increase in information is reflected in the growing size of journals. The *Journal of Biological Chemistry* published 19,862 pages in 1988 and 53,130 pages in 2003. This growth is similarly reflected in *Diabetes Care,* which published 853 pages in 1988 and 3368 pages in 2003 (P. Banks, 2004).

On its way to print, a manuscript will be scrutinised by a reviewer only if it has passed the journal editor's first appraisal. It may be rejected outright if it is obviously flawed or deals with a topic clearly outside the journal's scope. The *New England Journal of Medicine* publishes about 6% of submissions, but approximately 50% of papers are rejected before peer review, as are approximately 25% of the *Journal of Occupational and Environmental Medicine. Science* is rejecting approximately 6,000 papers per year before peer review, about half of the submissions the journal receives annually. These submissions are steadily increasing (McCook, 2005, 2006). In making these decisions, the editors of these high profile journals are effectively the main reviewers and their decisions have "become, quantitatively, much more important than the judgement of the reviewers" (P. Lawrence, 2003, p. 260). Those articles that pass through the editor's cut are despatched to the reviewers. Most journals select two reviewers for each paper (Vries, 2001, p. 235), although this is discipline specific. This system can cause delays of up to a year. Even journals with what is considered a 'fairly rapid' turnaround, usually take six to eight weeks to make a decision. If this decision is positive (usually subject to amendment), the study is then published within a few months of the final manuscript being received (Torgerson, Adamson, Cockayne, Dumville, & Petherick, 2005).

Ironically, having a high submission rate and therefore high levels of rejection is a sign of a journal's prestige (Vries, 2001, p. 236). Higher profile journals such as *JAMA* have rejection rates as high as 92% (DeAngelis & Musacchio, 2004). All journals in the *Nature* stable have an acceptance rate of less than 10% (McCook, 2006), and *Nature* itself has to reject about 95% of biomedical papers (P. Lawrence, 2003). Even journals with a considerably smaller scope are affected. *The Economic Record* published its rejection rates for the years 2001-2004 which ranged from 56% to 70% of the completed submissions (Editors, 2005). The rejection rate for *Plastic and Reconstructive Surgery* was approximately 55% (Goldwyn, 2005).

The sheer size of these numbers indicates that authors are overestimating the quality of their research and 'aiming too high' when submitting their work to a journal, and so are contributing to the delay in publication of their paper. This is partly due to the intense pressure to be published in a handful of top journals because of the Reward function discussed below, so instead of sending less-than-groundbreaking work to second- or third-tier journals, more scientists are first sending their work to elite publications, where they often clearly do not belong. Unsuccessful papers are then resubmitted to a second journal and so on, ricocheting down the publishing chain (Steele et al., 2006). A delay in having a paper published is only one outcome of this information explosion. Each paper that has been refereed and then rejected also represents time that a scholar has donated to the publishing system as a referee.

A large proportion of the academic community is engaged in some sort of peer review activity such as reviewing papers, editing, and paper selection (Rowlands et al., 2004a). This is undertaken by the academy for the publishers, usually for little or no compensation. While not explored in this thesis, it should be noted that peer review is not limited to reviewing papers for journals or conferences. Scholars also spend time assessing grant applications and promotions as well as PhD[2] and Masters theses. Peer review is one of the communication practices researchers undertake.

Open access and Certification

The process of peer review, however flawed, is centrally important to the academic community. However, as discussed above, the current peer review system is inefficient: "A pre-print does not need to be resubmitted to multiple rejecting journals of decreasing quality to find its appropriate public venue" (Rodriguez, Bollen, & Sompel, 2006, p. 151). The question arises, can open access offer any improvements to the peer review system? This section will discuss several examples of alternative ways to improve the certification process in new publishing systems. For example, the Berkeley Electronic Press, or bepress[v], allows authors to submit to a central point for assessment so the refereeing only occurs once. This is more efficient because it uses only one set of referees to publish a paper, and has been described as "a market for articles" (R. Watson, 2005).

A more radical proposal is for review to take place after publication rather than before it (Esposito, 2004). In effect, 'preprints' would be the primary publication, and both informal and formal reviews would be appended to them. If editorial-board approval is given, most

[2] At the risk of sounding obsequious, may I thank you here for your time in assessing this PhD.

likely for a revised version, the paper's details would be entered into the relevant journal's contents-page, with a link to that accreditation added to the preprint. Under this model, the journal 'goes virtual'. If this were to become a method of publishing, effective version management would be essential for citation purposes (Pitts & Stanley, 2007). Work is currently underway on developing international standards for version identification (Pinfield, 2007).

In some ways, this model is already being used in *PLoS One*, an international, peer-reviewed, open-access, online publication which accepts reports on primary research from any scientific discipline. Submissions are assessed on technical concerns by a member of the editorial board before publication. Once the paper is published, usually within 14 days of submission, it is made available for community-based open peer review involving online annotation, discussion, and rating[vi].

The peer review system is evidently flawed and requires a large input of researchers' effort and time, and new technologies including open access dissemination options offer alternatives to the traditional system. The question that arises that is relevant to this research is whether peer review is perceived by the research community as being flawed or a drain on research time, and therefore whether arguments that open access can improve peer review are effective within the research community as a reason to adopt open access dissemination options.

Archiving

Issues of archiving are not necessarily considered essential by individual scholars. Indeed, in one study, the two least important conditions of using a digital repository according to the respondents were the long-term preservation of the work (22.6%), and interoperability with other archives (37%) (Pelizzari, 2003).

Open access and Archiving

Traditionally, paper versions of journals were distributed worldwide, so there were copies of the same journal issue in separate locations. This meant libraries acted as archives by default. Now that libraries often only subscribe to the electronic version of journals, and some journals do not actually have a print version, an electronic replica of the old system has begun, called Lots of Copies Keep Stuff Safe – LOCKSS[vii].

Libraries are entrusted with the long-term preservation of knowledge, and institutional digital repositories have been promoted as a potential destination for the grey literature

arising from research at a given institution (M. Banks, 2005). Recent calls have echoed these ideals, with a declaration made in 2004 about the openness of data in recognition that, "an optimum international exchange of data, information and knowledge contributes decisively to the advancement of scientific research and innovation" (OECD, 2004). Open access digital repositories offer a solution to the long-term issue of archiving grey literature, the supplementary data and background information that surrounds a research project, which is often important to other researchers wishing to replicate and build on the work at a later stage.

The function of Archiving is relevant to this thesis in that it provides an incentive for governments and funding bodies to develop repositories and encourage researchers to place material in them, however Archiving does not appear to be top of mind for the individual researcher.

Reward

Possibly the most important function of journals to individuals within the scholarly publication system is the fifth function, Reward. This is the function that has been substantially responsible for the journal's change of focus from communication to career tool:

> Research practices are directly shaped by systems of evaluation, changing funding patterns and priorities. Existing evaluation and reward structures tend to lead to conflicting incentives in relation to scientific and scholarly communication (Houghton, Steele, & Henty, 2003, p.127).

Funding bodies and Reward

Funding for research is increasingly tied into a metric assessment of a researcher's output. A 2002 report on electronic publishing in science stated that: "In science, publication is the key currency. It is the primary measure of a scientist's productivity, and affects one's reputation, promotion, intellectual property claims and future access to both intellectual and financial rewards" (American Association for the Advancement of Science, 2002, p. 1).

The Reward function of journals is often manifested in terms of funding, which is regularly assessed by measuring researcher publications. Money for scientific and medical research comes from various sources. In Australia, the UK and the USA, the largest proportion is government sponsored, through universities and research institutions, "84% of the 65,000 articles originating in the UK in 2002 derived from publicly-funded research" (UK House of Commons Science and Technology Committee, 2004b). In Australia, the Federal

Government provides the main source of research funding through direct university funding and through funding bodies such as the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC). In the USA, organisations such as the National Institutes of Health and the National Science Foundation are major sources of funding.

Other sources of funding include trust funds (such as the Wellcome Trust in the UK). In addition, "[n]umerous non-governmental organizations and funding bodies contribute to science. The American Chemical Society, for instance, administers the Petroleum Research Fund (PRF). The PRF distributes some US$20 million annually, providing seed money for research and development in energy and fuels" (Chesler, 2004, p. 292). When determining whether to allocate funds to a grant application, these bodies need a way of assessing the value of a particular scientist's work. Regardless of the many problems with this system of measurement, institutions and governments world-wide are increasingly relying on metrics to make grant and promotion decisions, partly because of the difficulty with assessing the papers of a candidate working outside their own subdiscipline (Monastersky, 2005).

For example, in the UK, the Research Assessment Exercise (RAE) is moving towards a metrics based system after the 2008 round called the Research Excellence Framework, which "will make greater use of quantitative indicators in the assessment of research quality than the present system, while taking account of key differences between the different disciplines" (Higher Education Funding Council for England, 2008). In Australia a change in government at the end of 2007 spelt the end of a planned Research Quality Framework (RQF) (Expert Advisory Group for the RQF, 2005) based on the RAE, however, this has been replaced by a new assessment process called Excellence in Research Assessment (ERA), bearing many similarities (S. K. Carr, 2008). A recent phenomenon, university-ranking systems, such as those produced by the *Times Higher Education Supplement*[viii] and the Shanghai Jiao Tong University[ix], use metrics as one of their assessment factors.

Impact factor and Reward

These metric systems rely on the Science Citation Index (SCI) which was developed by Eugene Garfield in 1961 as a way to: "evaluate the significance of a particular work and its impact on the literature and thinking of the period. Such an 'impact factor' may be much more indicative than an absolute count of the number of a scientist's publications" (Cawkell & Garfield, 2001, p. 154).

The SCI counts how many times an article is 'cited' by other articles. This number then contributes to a journal's impact factor, which is published in Journal Citation Reports (JCR). The more prestigious the journal, the higher the impact factor (Garfield, 2000). The best scenario for an academic is to have an article published in a high impact journal because the JCR impact factor "has moved in recent years from an obscure bibliometric indicator to become the chief quantitative measure of the quality of a journal, its research papers, the researchers who wrote those papers and even the institution they work in" (Amin & Mabe, 2007, p. 1). The JCR impact factor of a journal is calculated by dividing the number of citations it receives in the current year by the number of research or review articles it published during the previous two years. Journals with high impact factors tend to attract leading researchers, and those who aspire to be leading researchers, as there is a strong perception that the higher the impact factor, the 'better' the journal (Steele et al., 2006).

It is widely agreed that using a journal's impact factor as a system of measurement is highly flawed for many reasons (Bollen, Sompel, Smith, & Luce, 2005; B. D. Cameron, 2005; Hecht, Hecht, & Sanberg, 1998; Steele et al., 2006). These include the small number of 'core' journals which are counted in impact factors, the problem with using a two year citation window in disciplines where papers have a considerably longer half-life, the advantage of disciplines with a high citation rate, the emphasis on English language papers, the difficulties with assuming that all papers in a journal of a given impact factor are of the same quality and the questionable formula used to make the calculations. A major criticism of the SCI is its lack of scope, covering only a few thousand core journals, a small fraction of all scientific journals published in the world: "In effect, what Garfield did was to collapse the entire set of little specialty 'cores' into one big 'scientific core' and he used this set of journal titles as the basis of ISI's emerging Science Citation Index" (Guedon, 2001, p. 12)[3]. By measuring the quality of the *journal* rather than the *article* it leaves the ridiculous situation of a bad paper in a good journal being 'worth' more than an excellent article in a nondescript journal. This system is partly responsible for the high submission load of prestigious journals.

[3] Eugene Garfield Associates which originally developed the SCI, became the Institute of Scientific Information (ISI) which was sold to Thomson Scientific, which in turn has recently become Thomson Reuters.

Researchers' publication and Reward

Researchers in Australia answer to three 'masters'. First, they are members of one or several academic communities consisting of the people working in their specific sub-specialisation. These communities are often spread across the world. These communities have their own norms and expectations. However, researchers also work within institutions and must report to that institution for promotion. Their third 'master' is the grant funding body. Grants are highly competitive, of the 4112 proposals for ARC funding in 2008, only 21.4% were successful (Australian Research Council, 2007b). Of those successful grant applications, few are allocated the full amount that was requested (Rowbotham, 2008). In the UK, where applications to the RCUK have a 28% success rate, a study by Research Councils UK (Research Councils UK, 2006) has shown that the annual amount spent on preparing and submitting grant research proposals is £121.5 million. This represents approximately 6% of the total costs of the councils. The cost of preparing grant applications in Australia is proportionally even greater given the smaller research community, with one estimate putting the figure at AU$114million a year in researcher time alone (Houghton et al., 2006).

Researchers are altering their publishing behaviour to meet changing requirements. Butler (2003) showed that when changes were made to the assessment for funding allocation in Australia in 1993 to include publication output, the number of publications rose dramatically, but because there was no measure of quality, these extra publications tended to be at the lower end of the impact scale. Pinfield (2004) made the observation that the UK's RAE does not just measure but also determines publishing behaviour in universities: "Institutions and their authors behave in ways that they believe will maximise their RAE scores" (p. 308). More than a decade ago, the observation was made that:

> the increasing awareness of journal impact factors, and the possibility of their use in evaluation, is already changing scientists' publication behaviour towards publishing in journals with maximum impact, often at the expense of specialist journals that might actually be more appropriate (Seglen, 1997, p. 498).

Examples of this behaviour include self-citation and deliberately writing review articles because of their generally higher impact (Steele et al., 2006). The emphasis on impact factors by promotion and granting bodies has spurred papers that explain to researchers specifically what journal impact factors and citation indices are, with the potential attendant aim of demonstrating ways to maximise citations, for example (Cartwright & McGhee, 2005).

This reliance on publication output is a serious situation for many researchers. The world-wide move towards metric, dubiously quantitative, assessment of work potentially poses the greatest barrier to a revolution of the scholarly communication system. The reward system provides a compelling reason for scholars resisting changes to current work practices as any change to the practice potentially jeopardises the academic's standing (Bjork, 2004; Harley, Earl-Novell, Arter, Lawrence, & King, 2007; Steele et al., 2006).

Open access and Reward

There have recently been several suggested alternatives to the current Reward system, which relies almost solely on a journal's impact factor provided by Thomson Reuters. As discussed this is a highly flawed method of measurement. One alternative is the 'journal diffusion factor', which looks at citation repetition (Rowlands, 2002). Others include the Hirsch's h-index which states: "A scientist has index h if h of his/her Np papers have at least h citations each, and the other (Np−h) papers have no more than h citation search" (Hirsch, 2005). There have been criticisms that this index gives undue merit to researchers who publish many papers, and is not necessarily an indicator of quality. More recently, Egghe's (2006) g-index has been proposed, which aims to improve on the h-index by giving more weight to highly-cited articles.

There are simple electronic alternatives to straight citation counts such as counting the number of times an electronic article is downloaded. This means "scholars can have a much more accurate picture of what is being read than what is offered by the traditional reliance on citations" (Galvin, 2004). One of the issues of measuring usage of electronically published papers is that the number of hits or downloads a paper has had does not necessarily translate into the paper being read. Because of this, one suggested way of incorporating the use of online technologies has been to make comparisons between downloads and citation data (Bollen et al., 2005). There has been some evidence recently that citations of certain articles in journals do not reflect the downloads of articles from the same issue (Coats, 2005), which may indicate that citations are not necessarily a good indicator of actual use of articles. This is countered by research that found Thomson Reuters citations correlated well with web citations if these included all types of web citations, that is: not only citations, but being included in a reading list, if the paper is listed on a CV, if the paper is in Medline, if it is cited in a conference and if a Web bibliometric service lists the article (Vaughan & Shaw, 2004).

Research that has quantified the use of electronic journals found that online researchers read only the abstracts of longer articles but shorter articles are read in full (Nicholas &

Huntington, 2006, p. 50). However it seems there is a relationship between online hit counts and subsequent citations of the paper. One study has shown that, "early hit counts capture at least to some extent the qualities that eventually lead to citation in the scientific literature" (Perneger, 2004). This opens up an unparalleled opportunity to track article usage.

In addition, there have been several aggregating tools developed recently in competition with Thomson Reuters' Web of Science. Scopus, launched in 2004 by Elsevier, claims to provide full coverage from 1996 onwards and covers 33 million abstracts, 15,000 peer reviewed journals and 386 million scientific webpages, according to its website[x]. Scopus however only provides citation data for the items indexed by it. Another is Google Scholar, which does not provide information about how many records it includes. Its website states that because it is freely available, Google Scholar indexes data from publishers only if the publisher will provide the abstract free[xi]. However, all aggregators are not created equal, a comparison of the h-indices of specific researchers based on citation counts from the traditional Web of Science, Scopus and Google Scholar showed there were differences both between the databases, and between disciplines (Bar-Ilan, 2008). A separate comparison of the three tools showed little difference between the Web of Science and Scopus, but that Google Scholar produced more citation counts (Bauer & Bakkalbasi, 2005). A study by Clarke (2008) found that for the information science discipline, Google Scholar offered better coverage than the Web of Science database. These results indicate that none of the aggregators are completely reliable, There are many other aggregating tools being developed, for example the freely available 'Publish or Perish'[xii] created by Ann Harzing, and journal ranking tool Eigenfactor[xiii], which includes journal articles and reference books, newspapers, trade magazines and software packages.

The issue of Reward is central to the reasons researchers adhere to the current scholarly publishing system. They need publications for promotion and funding. However, the link between publication and research evaluation and funding also provides the potential 'leverage' required to encourage open access (Houghton et al., 2006). This research therefore aims to answer questions about how deeply embedded the question of future reward outcomes are in the choices researchers make when communicating and publishing their work, and whether this affects their engagement with open access dissemination options.

Copyright

Copyright sits outside the described functions of the journal, and yet is integral to many of the arguments for a change to the scholarly publishing system. Copyright is a set of rights that sits with the originator of a work of a literary, dramatic, musical, artistic, or cinematographic nature (Clarke, 2005) The basic principle of copyright "protects and balances the rights of the author and public" (Willinsky, 2006, p. 41). Copyright represents control of the academic output, and when considering the costs associated with the scholarly publishing industry it is easy to see there are groups with considerable vested interest.

Universities generally waive their copyright on research outputs, which means that researchers own the copyright of their written work unless they sign it away (Gadd, Oppenheim, & Probets, 2003). The Registration function of journals requires authors to publish in recognised outlets, and copyright is an issue in the open access debate because currently most commercial and many not-for-profit publishers require authors to sign a copyright transfer agreement when they release their work to be published in a journal or conference proceedings. Signing transfer agreement forms giving the distributors (publishers) copyright over their work before publication means the author of a paper must apply for permission to use their own published work if they wish to reproduce some of it later in another form.

In an electronic era, the focus of scholarly communication has moved from publication to dissemination. There is a need for copyright laws which reflect technologies available to the community. Core values of science include access and affordability of scientific information. Increasingly, governments and the scientific community are realising that there is a need for "evolutionary changes in the patterns of current licensing practices for electronic publishing are required that encourage wider, faster, less expensive access to a broad range of scientific works" (American Association for the Advancement of Science, 2002, p. 3). This requires authors to have more control over the dissemination of, and access to, their work.

While publishers and governments are focused on copyright (Benkler, 2001`), there is a question whether individual scholars care about giving away their copyright. It may not necessarily be a pressing issue for many researchers, but studies have shown that authors do have concerns about copyright. One study which attempted to ascertain what level of copyright protection researchers wanted, found that "academics have a wide range of views on the protection their self archived works require" (Gadd et al., 2003, p. 350).

Another study found that copyright is a negligible issue for authors: "Only 13% said that they took a 'detailed interest' in the small print of the copyright agreement when they published their last article and, significantly, nearly half of all authors, 46%, admitted that they took no interest at all" (Rowlands et al., 2004a). Those authors who did express interest in copyright tended to be unhappy with the current copyright system.

Open access and Copyright

Allocation of the copyright of scholarly articles to publishers is considered by many open access advocates to be an issue that must be resolved in any move to an open access system. While the ownership of copyright of published scholarly works is not necessarily a major concern to most researchers, the technical and legal aspects of this issue must be addressed for open access to work.

One contribution of the open access model is avoidance of the loss of copyright control by the authors. It can be argued that publishers require some degree of copyright control as it is by this means that they obtain subscriptions. Even allowing for that, there is still the problem that publishers currently hold the copyright controls in perpetuity. One alternative to this situation is that primary research papers should be held in trust by the publishers for the scientific community rather than owned by the publishers (Hopkins, 2001). Another possibility is that there should be retention of copyright by publishers even under an open access system, but only in the case of commercial use where a fee would be applicable. This ensures “the published content is not misused in any way that would serve a commercial company’s business ends at the expense of the integrity of both the researcher and the journal. We maintain another revenue stream for the journal, which allows us to keep author charges as low as possible in the immediate future” (Gedye, 2004, p. 272).

Willinsky (2003) argues that the fee-based model of access to research runs contrary to the spirit of copyright law. Retention of copyright is one of the recurring issues in the open access debate: “The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited” (Open Society Institute, 2002). In 2008, the Faculty of Arts and Sciences at Harvard University introduced a mandate for depositing all published articles in the university repository which included copyright retention, placing those rights in the hands of the institution running the repository (Darnton, 2008).

There have been several major projects addressing the copyright dilemma. One solution is for authors to attach an addendum to the publisher's agreement:

> For articles published in journals with more restrictive copyright policies, authors may employ a 'pre-print + corrigenda' strategy, where they post an additional file, which lists changes and additions, with the archived pre-print draft of the article. This is a legal method that authors can use to regain control over their own work (C. Hess, 2005, p. 9).

To that end, several organisations have released author rights addenda for authors to attach to publisher's copyright agreements, (MIT, 2007; Science Commons, 2007) being a small sample. Addenda are legal instruments to allow authors to retain certain rights for their articles "such as distributing copies in the course of teaching and research, posting the article on a personal or institutional web site, or creating derivative works" (SPARC, 2007). These addenda are needed for the publishers that do not allow self depositing of articles into repositories, and for situations where the journal later changes its access policy. Many of these addenda have arisen from a large non-profit project out of Massachusetts Institute of Technology called Creative Commons, which "provides free tools that let authors, scientists, artists, and educators easily mark their creative work with the freedoms they want it to carry" (Creative Commons, 2007).

Not unexpectedly, publishers have started fighting back, with the International Association of Scientific Technical and Medical Publishers, the Association of American Publishers Professional and Scholarly Publishing and the Association of Learned and Professional Society Publishers releasing a white paper emphasising an appropriate 'balance' for publishers and authors, stating that academic authors and institutions should be able to use and post their own content for "internal institutional non-commercial research and education purposes" but that publishers "determine when and how the official publication record occurs" (STM AAP PSP & ALPSP, 2007, p. 3).

The issue of copyright is relevant to this thesis because many proponents of open access state that copyright issues are central to change. However, the question is whether copyright is an issue that resonates with the academic population and therefore whether it is a barrier to the uptake of open access scholarly communication in Australia.

Summary

This chapter has provided background to the research question "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?" by examining the challenges facing the scholarly

communication system within which researchers function. These challenges are that the Reward system requires an increasing amount of literature to be produced and sent to those journals with the highest impact resulting in a high rejection rates and increased time spent in the peer review aspect of Certification, and these delays in turn affect the Awareness function of journals.

This analysis articulates the broad inadequacies of the scholarly publication system defined in Chapter 1: that academic articles are written by the academic community, peer reviewed by the academic community and often edited by the academic community, with no compensation, yet the high subscription costs of commercially published research is a barrier to increased and improved dissemination of knowledge. This chapter also indicates that open access offers solutions to many of these issues, and potentially offers a cheaper and effective method for the dissemination of knowledge. This would appear to be a considerable incentive for researchers to adopt open access dissemination options. This research therefore aims to answer questions about how deeply embedded the question of future reward outcomes are in the choices researchers make when communicating and publishing their work, and whether this affects their engagement with open access dissemination options.

The next chapter will look at how repositories provide an open access option and explores the uptake of open access amongst the academic community.

Chapter 3 – Researchers and repositories

Introduction

The previous chapter described how open access offers solutions to many of the challenges facing the scholarly communication system. This chapter explores the idea that understanding the communication behaviours of the individual scholar is central to any large scale uptake of a new scholarly communication system, and that research into the field of repository use has, to date, been restricted to snapshots of the scholarly community via large internet surveys.

The chapter begins with a description of the two ways of achieving open access dissemination: publishing in open access journals and depositing articles in digital repositories. It then describes how open access will affect different members of the scholarly community. The chapter will then explore the question of who is sharing their work in this manner to help illuminate the question of why many scholars are choosing not to do this.

Achieving open access – the gold road

If, as Chapter 2 has demonstrated, open access offers a wider and more inclusive dissemination of information than the current scholarly communication system, the next question is: how is open access achieved? There are generally two ways, described as the 'gold' and 'green' roads to open access, referring to open access journals and digital repositories respectively (Harnad et al., 2004b). For reasons explained below, this research will focus more closely on repositories than on open access journals. However, to ensure a complete picture of the open access dissemination landscape is provided in this work, a brief discussion of the open access journal option is provided here.

As stated in Chapter 1, open access generally refers to the dissemination of research in a way that is freely available to any interested reader with an internet connection. The 'gold road' to open access dissemination refers to open access journals, broadly defined as journals that do not charge a subscription fee. Wilinksy (2006) offers ten 'flavours' of open access, several of which are 'gold'. In some cases the journal operates without cost to the reader or the author, an example of 'Cooperative' type of open access journals, in other cases subsidies from scholarly societies or elsewhere provide the financial support for

'Subsidised' open access, and there is also 'Dual-mode' where the subscriptions for print editions also cover the cost of open access online.

A fourth gold flavour of open access Willinsky describes is 'Author fee', which is a business model that emerged to allow commercial publishers (and scholarly associations who rely on membership in exchange for journal publication) to publish open access journals and also continue in business. This is achieved by charging an up-front fee to cover the costs of reviewing and editing the paper, often referred to as the 'author-pays' model. This term is slightly misleading, as it is usually the author's institution or funding body that covers the cost, so the term 'pay on acceptance' is more accurate. There are institutional models under this system, such as BioMed Central where the institution pays a membership for the researchers to publish in the open access journals. It should be noted, however, "OA journals that charge processing fees usually waive them in cases of economic hardship" (Suber, 2007b). Some examples of policies of fee waivers are (BioMed Central, 2008; Nucleic Acids Research, 2008; PLoS Public Library of Science, 2008).

There are potential issues with this system. For example the sustainability of a pay on acceptance model is particularly problematic for journals with high rejection rates (DeAngelis & Musacchio, 2004). The system that has authors paying for publication either directly or through sponsorship from institutions or interested third parties means that, "science will either have a less effective filter, or will require the introduction of new post-publication filtering mechanisms" (Crawford, 2003). The system is biased towards the author's goal of publication rather than the reader's goal of effective filtering. There is also a potential conflict of interest in the refereeing process, where "the incentives for editors in an author-pays model will be to publish more papers not fewer" (Horton, 2003). This issue has also been raised in surveys of authors' attitudes: "Feedback has also highlighted the essential requirement that author charging and editorial decisions be completely separated and seen to be separated. Authors should be reassured that their ability to pay publication charges will not influence editorial decisions in any way" (Richardson & Saxby, 2004).

One method publishers have developed to introduce the idea of authors paying to have their work freely accessible is to develop a hybrid model for their journals. In this model, a journal offers authors the opportunity to publish their work in open access for a fee, and (in theory) reduces the subscription cost in proportion to the number of articles that are published in this fashion. If the author chooses not to pay a fee their work is only accessible to subscribers. Some of the journals offering a hybrid option have 'anticipated'

the subscription cost of the journal will be reduced according to the number of open access articles that appear in the issues (Suber, 2006). This is happening with at least a few publishers, with Oxford Journals announcing:

> In 2008, the average increase across all Oxford Journals titles is 6.9%. For the 28 Oxford Open titles with open access uptake in 2006 (the last full calendar year on which we could calculate), the average 2008 online-only price increase is just 1.7%. This is due to adjustments to the online-only prices of these journals which reflect increases in the percentage of open access content published between 2005 and 2006 (Richardson, 2008).

There has been a recent surge in hybrid models, with the proportion of publishers offering this to authors growing from 9% in 2005 to 30% in 2008 (ALPSP, 2008). Of hybrid journals available to researchers in 2007, 12 were published by for-profit publishers, and 65 by societies. Only two hybrid journals were in the social sciences with the remainder in the STM fields. "Hybrid journals are clearly most common in the fields in which most authors have research grants from which they might be able to pay the journal's publication fee" (Suber & Sutton, 2007). There is little available evidence of the level of uptake of this option by authors, although apparently 18% of authors publishing in journals published by the American Physiological Society have done so (Biello, 2007). A 2008 study showed that "the take-up of the author pays open access option is exceedingly low" (ALPSP, 2008).

Some institutions have programs to pay for publication charges in open access journals, for example the University of Nottingham (2007) has established an Open Access Publications Fund and the Library of the University of Amsterdam (2007) has also offered an open access fund since January 2007. The University of California Berkeley launched a program in January 2008. Established programs have not had a high uptake, the University of North Carolina-Chapel Hill launched a program in March 2005 but only 14 grants had been allocated by May 2008. The University of Wisconsin-Madison program offering authors half of OA fees has allocated only 16 awards since its inception in 2006 (Adams, 2008).

A potential drawback of the hybrid model is the 'tipping point' when subscribers decide that enough of the journal is online to warrant canceling the subscription (Prosser, 2003). This is probably more of an issue with individual subscribers, as libraries tend to hold their subscriptions in bundles, which would make individual cancellations difficult. In fact the hybrid model initially increases costs to the institutions (universities, funders and

governments) because they will be, at least for a while, paying for both kinds of publication (Suber, 2005b).

Open Journal Systems

Open access advocates have developed tools to help people wanting to start up an open access journal. Open Journal Systems (OJS)[xiv] is open source software that has been developed by the Public Knowledge Project at the University of British Columbia. It began as a proof of concept to test the degree to which an open source and easily configurable piece of software can reduce the cost of running a journal by moving the process online, not only in the publishing and distribution of the journal, but in its actual day to day management (Willinksy, 2006). OJS sets up a website for the journal which acts as an editorial office for editors, reviewers, authors, copyeditors and others. The program labels, files and tracks all submissions.

As one example of how OJS works, the National Library of Australia has adopted OJS and is successfully managing an online open access journal publishing service. The library began by migrating the journal from the Association for the Study of Australian Literature, JASAL, to an online format, using OJS to assist with every stage of the refereed publishing process, from submissions through to online publishing and indexing. It is now increasing its stable of open access journals (Graham, 2006).

Achieving open access – the green road

The alternative to open access journals, the 'green' method of open access dissemination, is achieved by making the author's versions of articles available online. This can be through an author's own website, although generally digital repositories are considered to be more 'robust' because individual websites are likely to die with the author or be lost if the author changes employment. Digital repositories are also searchable due to a requirement that they comply with the Open Access Initiative (OAI) Protocol[xv] which requires interoperable standards for searching of repositories. The term 'self-archiving', while widely used in open access discussions, is inaccurate because the person who is doing the 'archiving' has no control over the long-term life of the item. A more accurate term, and one which will be used throughout this thesis, is 'self-deposit'. It is important to note that depositing an article in a repository does not, in itself, constitute publishing.

The word repository can mean many things. This thesis is concerned with digital repositories which are: "usually considered to mean a place where one deposits … objects such as peer-reviewed research manuscripts for the purpose of providing open access.

The … object needs to be captured at creation time otherwise it is soon lost" (Sale, 2005a). A simpler definition includes the descriptors: cumulative, perpetual, open and interoperable (Ware, 2004a). Incorporating all these definitions, repositories provide the means for the alternative, 'green' road to open access, when an author can self deposit a pre-print, the digital text of a peer-reviewed research article before refereeing or post-print, a copy of the refereed article, in a digital repository.

Repositories are developed with different purposes in mind. This thesis is predominantly concerned with institutional and subject-based repositories. While this author has previously argued that "the term institutional repository is often narrowly applied to repositories run by universities and other research-oriented employers. It is more appropriately used as a broad term to encompass both those and the repositories that have been run by learned associations and other scholarly communities since as early as 1991" (Clarke & Kingsley, 2008), the discussion in this thesis requires a delineation between different types of digital repositories.

A functional definition of an institutional repository adopted in this thesis is: "A set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members" (Lynch, 2003). An alternative type of repository is a subject-based repository. This term is used in the literature but is not the optimum word to explain this type of repository because the term generally refers to repositories that not only belong to a scholarly community, but also a discipline or research domain.

Despite the large amount of material written about digital repositories there is still a small proportion in existence in institutions world-wide. As of September 2008, 1145 repositories were listed on the Registry of Open Access Repositories (ROAR).[xvi] Of those, 611 are 'Research Institutional or Departmental'. The World List of Universities[xvii] on the same day lists 8136 universities in 198 countries. A simple calculation indicates that only 7.5% of universities worldwide have a repository with the correlating result that 92.5% do not. However, Australia is in a unique position worldwide because as of September 2008, 32 of the 39 universities have active repositories, of which 31 are open access. A further three universities are planning to launch their repositories later in 2008, two have plans to launch in 2009, and the closed access repository is planning to open access to items in 2009. This means 37 Australian universities should have active repositories by the end of 2009 (Kennan & Kingsley, 2009).

For those who argue that a digital repository's main function should be to provide free access to the literature, the breakdown of the content in repositories must be disappointing. A survey of 45 repositories undertaken in 2003 had an average number of documents per archive of 1256. The breakdown of these was 22% e-prints, including pre-prints and post-prints. Theses and dissertations made up 20%, with the remaining 58% made up of other documents including grey literature, such as technical reports, and working papers (Ware, 2004b, p. 25). Despite the large number of Australian repositories, looking at the number of items in Australian repositories listed on the OpenDOAR[xviii] website demonstrates that initial uptake of the repositories has been slow in that country. A more recent survey has shown that of the repositories in Australian universities, three have more than 5,000 open access items, the remainder have 1000 or fewer items (Kennan & Kingsley, 2009).

Clearly there is a barrier to scholars depositing their work in institutional repositories. Generally, subject-based repositories are enjoying a greater level of self-depositing than institutional repositories. As a demonstration of this preference, it is instructive to look at the participation levels of three subject-based repositories[4]. According to its site, arXiv, at the time of writing, offers: "open access to 451,387 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology and Statistics". RePEc (Research Papers in Economics)[xix], holds 222,000 working papers, 316,000 journal articles, 1,500 software components and numerous listings from books and chapters, author content and publication and institutional contacts. In the biological and life sciences, PubMed Central[xx], run by the US National Institutes of Health (NIH), is a free digital archive of the journal literature. Begun in 2000, the archive holds approximately 650,000 items including digitised versions of articles dating back to the 1800s as well as new material added daily.

Institutional repositories, by contrast, have not enjoyed this kind of uptake. OpenDOAR[xxi] is a website listing providing information on over 1,000 academic research repositories. A cursory glance shows that in Australia, institutional repositories contain between a handful and several thousand items, with the larger numbers often representing collections of images, or metadata items without the full access version of a paper attached. This low participation rate in institutional repositories is reflected worldwide. Even at Cornell University, the home of arXiv, academic deposits into the institutional

[4] A more comprehensive list of subject-based repositories can be found at: http://www.icbl.hw.ac.uk/perx/analysis.htm under 3.3 An Analysis of Gap Areas, accessed 1 April 2008

DSpace repository have been low, with faculty indicating that those using a subject archive found it fulfilled their needs, making the institutional repository redundant (Davis & Connolly, 2007).

Variously, institutional repositories have been mooted as: a simple way of achieving open access without changing the scholarly communication system or threatening publisher's livelihoods (Harnad, 2003), a method of streamlining university administration systems (O'Brien, 2006), a way to assist with academic workflows (Foster & Gibbons, 2005), or a tool with which to fundamentally change the whole scholarly communication system (L. Brown, Griffiths, & Rascoff, 2007; Crow, 2002). There is no doubt that institutional repositories are potentially a very useful tool for many aspects of an institution's administration, from offering a method for collating all the output from an institution, to reporting to funding bodies. Some of the roles of a repository, such as disseminating scholarly communication, overlap with the traditional roles of a university library. Others, such as preserving material and data that is sometimes not usually seen (for example laboratory notes), or negative results that might later be used for analysis, are new to the library's role within the institution. However, while these roles assist administrations and institutions, they do not necessarily assist researchers and there appears to be greater voluntary uptake amongst the research community of subject-based repositories over institutional ones.

The focus of this research

This research investigates how the communication practices between scientists affect the uptake of open access dissemination options in Australia. Currently the coverage of open access journals is not complete across all academic disciplines. The exact number is a 'moving target' but was around 3-5% in 2006 and remains below 10% of the journal market (Willinsky, 2006). Even an academic committed to open access is dependent on either an open access journal being available in their field, or those journals that they publish in adopting a hybrid system that moves closer and closer to a fully open system, or on a publisher making the decision to launch a new open access journal (as PLoS has done).

Repositories on the other hand have enjoyed an explosion of interest and investment in Australia and currently offer a faster (and free to the academic) route to open access. Repositories have been launched in almost every university in Australia, so for Australian researchers to make work openly accessible through a repository is not restricted by

availability. For that reason this research focuses mainly on the use of and rollout of repositories.

Publishers and open access

Inevitably there will be some groups in the scholarly publishing system that will be more profoundly affected by substantial change than others. The main arguments against open access come from two actor groups in the debate, commercial publishers and not for profit publishers such as scholarly associations. Commercial publishers argue that open access threatens the viability of publishers, which could lead to a collapse of the scholarly publishing system, because without the possibility of new journals becoming financially viable it is unlikely publishers will start new titles, and if publishers offer their material as open access or allow material to be placed in repositories, libraries will cancel subscriptions.

Publishers are central to the communication practices of scientists, as all formal communication via scholarly articles must currently be submitted to and published by publishers. Therefore, the approach publishers are taking to the open access issue will to an extent shape some scholar's opinions about the issue. This chapter will now look at how publishers are meeting the challenges that open access has created.

Commercial publishers

Publishers are supporting open access in many ways. Some publishers, under their copyright agreements, allow authors to place their version of a published (or submitted) paper onto a website or into a repository. At first glance, the list of publisher's self-depositing policies[xxii] seems highly supportive of authors self-depositing their work in archives. The 'current journal tally' in September 2008 lists 95% of publishers as 'green' – a description used for publishers who allow self-depositing. There are, however, several caveats to this figure. To begin with there is a distinction between 'full-green' and 'pale-green' with the former representing the 62% of publishers who allow post-print self-depositing and the latter referring to the 29% who allow only the depositing of pre-prints. But this website has (as at November 2008) processed the policies of 457 publishers, which is not the total number of publishers. It is difficult to establish exactly how many publishers there are in the world, but an estimate can be made. In November 2008, the Association of Learned and Professional Society Publishers[xxiii] had just under 300 members in November 2008, the Association of American Publishers[xxiv] had 260 members and the International Association of Scientific, Technical and Medical Publishers[xxv] had 'about' 100 members. Many publishers will be members of all three associations, but one

analysis states the main English-language trade and professional associations for journal publishers collectively include 657 publishers producing around 11,550 journals (Ware, 2006). It is clear that the total number of publishers worldwide is greater than 457.

In some cases publisher's archiving policies have the veneer of opening access to research while actually protecting their commercial interests. An example of one of these policies is Nature Publishing Group, which in January 2005, announced a change to their self-archiving policy: "Authors are encouraged to submit the author's version of the accepted, peer reviewed manuscript to their relevant funding body's archive for release *six months after* publication." (author's emphasis) (Nature Publishing Group, 2008). This embargo period means this is actually delayed-access rather than full open access. The announcement accompanying *Nature's* statement did not mention open access:

> This policy has been developed to extend the reach of scientific communications, and to meet the needs of authors and the evolving policies of funding agencies that may wish to archive the research they fund. It is also designed to protect the integrity and authenticity of the scientific record, with the published version clearly identified as the definitive version of the article.[5]

An early argument against open access made by the publishers was that there is some sort of inherent danger in there being free and open access to scientific and medical information by the general public. Dr John Jarvis, director of Wiley Europe argued in 2004 that if material were more easily available then the general public might use the information badly:

> I will say again; let us be careful because this rather enticing statement that everybody should be able to see everything could lead to chaos. Speak to people in the medical profession, and they will say the last thing they want are people who may have illnesses reading this information, marching into surgeries and asking things. We need to be careful with this very, very high-level information (UK House of Commons Science and Technology Committee, 2004a).

This statement was later dismissed as a "silly one, probably expressed in the heat of the debate and not meant seriously" (Velterop, 2008, p. 118).

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[5] Information from American Scientist Open Access Forum available at: http://listserver.sigmaxi.org/sc/wa.exe?A2=ind05&L=american-scientist-open-access-forum&F=l&S=&P=3001 accessed 29 September 2008

The publishers' arguments have since become more sophisticated, with the American Association of Publishers (AAP) hiring a public relations consultant on the issue (Giles, 2007), which led to the launch of the Partnership for Research Integrity in Science and Medicine (PRISM)[xxvi] in 2007. This appears to be an attempt by publishers to 'market' themselves as the only medium that can be trusted with a gate-keeping role (Firestone, 2007).

This partnership stated that it intended to alert policy makers and citizens to "the very real threat to peer review that ill-considered government interference represents, and to explore the ways in which we can safeguard peer review as a critical component of scientific integrity" (Firestone, 2007). Many commentators have come out in reaction to this initiative, claiming that open access does not threaten peer review and that PRISM is a thinly disguised lobbying group for the publishing industry (Suber, 2007c). Despite PRISM not publicly declaring who their supporters are, it appears the main organisations behind it are the AAP, Wiley, Elsevier and the American Chemical Society (Giles, 2007).

PRISM has also had negative feedback from the people and organisations it purports to represent, with some groups and commentators specifically asking for clarification from their own publishing groups (Rust, 2007). At least one member of the council of AAP resigned over the issue (Howard, 2007). The Rockefeller University Press wrote to the AAP to ask that they put a disclaimer on the site stating that they were not in any way associated with PRISM[6]. In the context of the open access debate, the launch of PRISM indicates that the publishing industry is concerned enough about the moves by governments and funding bodies towards mandating open access to take action.

Another argument that is put forward by publishers against the widespread use of repositories for open access content is that as more material becomes open access, libraries will start to cancel subscriptions. There is little evidence to support this argument. Looking at the arXiv example, this highly successful and almost universally used (in the relevant disciplines) repository has been shown to have had no effect on the subscription rates of the journals publishing the final versions of the paper appearing in the repository (Beckett & Inger, 2006; Swan & Brown, 2005). There is evidence to show that readers use the preprint version until it appears in the journal, after which time the journal is where readers turn for the article. This represents "coexistence rather than

[6] One group calling themselves the "Partnership for Integrity in Scientific Dis-semination" have developed a parody of the PRISM website: http://pisdcoalition.org accessed 5 October 2008

competition" (Pinfield, 2007). Two studies that have asked the question of subscription cancellations (Beckett & Inger, 2006; Mark Ware Consulting, 2006), found pricing and usage were far more important factors in cancellation than the availability of material in an open access format. Despite the finding that the threat to subscriptions is high charges rather than the author's ability to deposit articles in repositories, these two studies are being used by the publishing industry to argue that institutional repositories spell a very real threat to publisher's livelihoods (Morris, 2007b).

Non-profit publishers

Scholarly associations or learned societies are a group of actors who are key players in the scholarly communication system, so will be affected by any change. While exact numbers are difficult to ascertain, approximately half of the journals listed in Ulrich's appear to be associated with non-profit organisations. Scholarly associations generally publish their own journals, but in some cases association journals are published by the commercial publishing sector. The five largest publishers produce just under 14% of the journals owned or sponsored by non-profit organisations (Morris, 2007a, p. 302).

Scholarly associations have a revenue stream from membership fees and (often subsidised) subscriptions to their journals. Associations use any surpluses from membership or subscriptions for several purposes, including keeping conference fees low, providing bursaries for attendance at the organisation's own and other meetings, offering research grants, public education, and keeping membership dues low and generally supporting the running costs of the organisations (Baldwin, 2004). However, it seems that the price charged to members for their society subscriptions is, in general, not covering the costs of providing the print journal, which means there is heavy reliance on institutional subscription revenue to support the journals, while the number of institutional subscriptions is falling (Waltham, 2006).

The open access debate has been particularly relevant to scholarly associations as they exist to advance the professional well-being of their members, including providing access to a forum for advancing knowledge. Given this, it is difficult to argue that keeping the status quo with subscriptions as a source of income is addressing these goals (Willinsky, 2003). This debate has opened questions such as: should scholarly societies primarily be fund-raising organisations for other activities in their disciplines, using their publications to bring in the necessary money, or should they be promoters of efficient scholarly communication and use their publications more directly to that end - for instance, by embracing open access? (Velterop, 2003).

There is no suggestion in these debates that societies abandon their publisher role, as they are arguably best placed to organise Certification, Rewards and the sixth function of Navigation (Armbruster, 2007). However researchers in one study have expressed that a move to open access means scholarly associations may not remain financially viable: "there was deep concern expressed over the financial sustainability of a switch to [the open access] model across the board" (Pitts & Stanley, 2007, p. 26). This is despite the open access model being aligned with societies' missions and providing increased visibility to their journals, and the authors and research they publish. At least one commentator has argued that moving to open access would actually be beneficial to small publishers (many of which are society publishers) because author charges represent a new source of income, and "small publishers will be able to compete for this source of revenue equally with large publishers as it is the impact of the journal and quality of publishing experience for the author that is important, not the ability to bundle large packages of journals" (Prosser, 2004, p. 21).

Recent research by Waltham (2008) has shown that having cheap access to the society journal is not the primary reason for people joining societies:

> Numerous surveys show that the primary reason for being a member of a society is for the opportunities that membership brings for conferences, networking and collaboration. The journal is always further down the list, sometimes in second place but never in first. Jobs and grants also usually feature quite highly, but the main reason for joining is the chance to get together with like-minded people (pp. 9-10).

There is an argument that societies would continue without the financial income derived from subscriptions because: "If learned societies are valued by their communities, which we believe to be the case, members are likely to remain loyal irrespective of the publishing model employed by their society" (UK House of Commons Science and Technology Committee, 2004b). This argument has been supported in at least one study where:

> all the researchers agreed that non-profit societies serve many necessary functions, in addition to journal publishing, for the fields they serve. Their members would not allow them to falter, and would if necessary support their journal through increased membership dues, if converting to an OA model were to have the effect of reducing society revenues" (Pitts & Stanley, 2007, p. 247).

Both publishers and scholarly associations potentially have challenges they will need to address to be able to continue within an open access system. It is worth noting their responses to the situation, because this could have bearing on how individual researchers perceive open access. As stated earlier, it is the individual scholar who holds the key to widespread uptake of open access, so this chapter will now discuss in some depth how researchers have responded to open access dissemination options to date.

Researchers and open access

Central to the question "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?", is the individual scholar. In Chapter 2 it was shown that open access offers a more effective way to disseminate knowledge than the traditional scholarly publishing system. It was also demonstrated that open access is a relatively simple publishing option. This leads to the question, if the scholarly communication system is so problematic and open access offers a better alternative, why has open access not enjoyed widespread uptake?

Scholars engage with the scholarly system on a daily basis, as authors, as readers and as reviewers. They have a vested interest in the system because it underpins their careers. Any change to the scholarly system will only occur if individual scholars are convinced the change will increase the usefulness, effectiveness and usability of the system. Information on individual views has generally been obtained through surveys in Europe and the United States, with several taking a broad sweep of the international scholarly community.

Awareness of and attitudes towards open access

It is interesting to note that despite several years of active debate and conferences, including legislation changes in the US and a parliamentary enquiry in the UK, "levels of awareness of the kinds of issues that are the focus of publishing seminars and library conferences are really surprisingly low among the research community" (Rowlands et al., 2004a). It is clear there remains a large proportion of the academic community who is unaware of the concept of open access, let alone the initiatives they might be able to use. One international study of 3787 authors showed that 82% of respondents knew 'nothing at all' or 'a little' about open access. The study points out that this is surprising given that the respondents were a self-selecting group who chose to complete a survey about new developments in journal publishing (Rowlands et al., 2004a).

While *awareness* of open access is limited, there is some indication in the literature that *attitudes* in academic populations reflect open access principles. One study found

researchers, "tended to view OA from a 'philosophical' perspective – as a fundamental requirement of largely publicly funded research, facilitated by the ease of electronic dissemination" (Pitts & Stanley, 2007, p. 246). Other studies have demonstrated that researchers have a theoretical willingness to publish in open access outlets. In a study of the faculties of Economics and Law of the University of Study of Brescia, Italy, over 66% of respondents answered they were prepared to personally deposit their own scientific or educational material in an institutional repository, once the conditions they requested had been fulfilled (Pelizzari, 2003). These conditions were (in order of numbers of requests); the possibility of continuing to publish in traditional channels, guaranteeing the integrity of their work, and indexation of the work to protect against irretrievability.

A study of 75 researchers has indicated that over two thirds of the respondents do (or would if a repository was available) deposit in institutional repositories (J. Allen, 2005). Another much larger study of 1296 researchers found that 81% of respondents would 'willingly comply' if their employer or research funder required them to deposit copies of their articles in an open archive (Swan & Brown, 2005, p. 63). However, these positive attitudes and expressions of intent are not translating into action, and it is important to understand the reasons why.

Barriers to publishing in open access outlets

There is an argument that the demand for open access dissemination is limited. An open access debate that was run through *Nature* in 2003 and 2004 did not end up greatly in favour of the idea (D. Butler, 2004). Another analysis in the same year concluded: "Clearly there is some sort of groundswell, but it certainly was not overwhelming, and early indications from proceedings of National Academy of Sciences in America and such like have not really supported the contention that it is huge" (UK House of Commons Science and Technology Committee, 2004a). This analysis found the groundswell appears to be in the molecular biology end of the science spectrum. This may be because molecular biology had an unprecedented experience with open access when the Human Genome Project[xxvii] was abandoned by traditional publishers and was created as an open access program, which transformed biomedical science.

Given the evidence of increased visibility for open access articles, it might be expected that researchers would be clamouring to be involved, yet as discussed in Chapter 1, the uptake has been low, with approximately 15% of articles being deposited into a digital repository (Poynder, 2005; Sale, 2005b), and only 10% of journals as open access (Lund University Libraries, 2008). However a more recent estimate indicates the numbers are even lower,

with 8.1% of articles openly accessible in journals and 11.3% of articles published which are available as copies deposited in e-print repositories or homepage. Combining these two figures gives an estimate of 19.4 % of the total yearly output which can be accessed freely (Bjork et al., 2008). This estimate is an addition of 4.6% of journal articles that were open access for the year 2006 and a further 3.5% which were delayed-access and available after an embargo period of one year, totalling 8.1%.

There is concern that publishing in open access journals does not count for promotions. In a study by Swan and Brown (2004a), "69% [of traditional authors] said they perceived OA journals in their field to have low impact and the same proportion said they perceive the OA journals in their field to have low prestige" (p. 220). This is not, in fact the case. A study of the nearly 200 open access journals that Thomson Reuters covers, found that the impact factors were similar to traditional journals, ranking close to the 50th percentile within their fields (Testa & McVeigh, 2004). In addition, 55% of traditional authors said they thought publishing in an open access journal would adversely affect their chance of winning grants, 74% thought it would limit the potential impact of their work, and only 42% thought it would adversely affect their chance of appointment and promotion.

Encouraging researchers to deposit their work in repositories has proved to be a difficult challenge. It appears there are three main barriers to filling repositories. The first, and largest, is a lack of awareness or understanding either of open access itself, or of how to participate. The second is a marketing issue. In asking faculty to add to their workload, there appears to have been little consideration to the 'what's in it for me?' question. The third challenge is the difficulties faced by those researchers who are aware and willing to deposit, but do not (or perceive themselves not to) have the necessary skills or expertise to self-deposit.

A likely reason for the low level of deposits in digital repositories is "ignorance or inertia" (Swan & Brown, 2004b, p. 69). The concerns that authors have about depositing material in an institutional repository include technical issues, the submission process, concerns about having preprints in the public domain and concerns about copyright (Pinfield, 2001). In one study, where about a fifth of respondents had deposited scholarly material in an institutional repository, the most published format was theses, followed by conference papers, accepted papers, pre-prints and datasets (Rowlands et al., 2004a). The problem might simply be one of a lack of awareness. The level of awareness of e-print archives was much lower than the respondent's familiarity with open access journals in one study (Swan & Brown, 2004a).

Another reason for the low uptake of repositories could be the need to make repository content more accessible and usable. There are many search engines apart from Google, which is very widely used (Swan et al., 2005), including Scopus, OAIster and BASE, but we are a long way from the holy grail of the 'One Great Scholarly Search Engine' (Willinksy, 2006). One method of encouraging repository use is to integrate them into current workflows, as is occurring in some disciplines. Today, some journals require pre-print submission to be made via a repository and the peer review process is directed through the repository, where reviewers are sent the url of the repository item rather than a file (Advances in Theoretical and Mathematical Physics, 2007).

Several case studies have offered different methods for obtaining material for the repositories, from trawling researcher websites with material and asking permission to transfer these to the repository (Andrew, 2003), to finding out which journals allowed the self-deposit of articles, and tracking which researchers at the institution have published in those journals (Mackie, 2004). Two other approaches have attempted to make the repository more in line with the researchers' natural communication requirements, such as creating personal web profiles for individuals (Foster & Gibbons, 2005) and developing communities for appropriate groups with their own workflow (Chan, 2004). The University of Melbourne has chosen a holistic approach, attempting to tie the UMER repository in with the university's administrative, financial and reporting systems. The aim is that users enter their details once and the information is then available in all relevant parts of the system. This aims to link funding, research, data, publications, access, citation, impact and assessment (O'Brien, 2006).

An obvious barrier to self-deposit in repositories is the difficulties in the process of placing an article in a repository, including entering the metadata about the article. Metadata describes the article and allows it to be harvested, citation linked, and searched seamlessly as if all papers were in a global archive. Information includes author, title, publication and date. A study analysing the number of 'keystrokes' this process takes found that, "a researcher writing one co-authored paper per month … spends about 39 minutes per year in metadata entry tasks related to self archiving" (L. Carr & Harnad, 2005, p. 6). This result was based on the conclusion that, on average, the time taken to upload a paper and enter the metadata was 10 mins 40 secs, with an average 1500 keystrokes to self-deposit. In addition, this deposit time shrinks as a user deposits more papers. The implication of this result is that self-depositing articles is a simple matter, and this study is often used by open access advocates in their arguments, however it does not reflect the true situation.

It is reasonable to argue that researchers should not have to take responsibility for depositing material: "Faculty are typically best at creating new knowledge, not maintaining the record of this process of creation … Most individual faculty lack the time, resources, or expertise to ensure preservation of their own scholarly work even in the short term" (Lynch, 2003). Having an administrative person undertake the depositing process was identified as a positive for a group in one study which showed the respondents objected to the idea of self-depositing, not on moral or conceptual grounds, but on purely practical ones:

> A substantial part of the 16% who declared their unwillingness to self-archive do so, not so much as a refusal of the initiative but rather as a request that others carry out the activity of archiving the material produced by the authors (generally, departmental or faculty technical/administrative personnel are mentioned) (Pelizzari, 2003, section 6.5).

Another barrier to adoption generally experienced across most disciplines is a lack of time or technical expertise on behalf of the academic. "All of the options for self-submission assume a basic level of IT literacy … In any institution there is an enormous range of IT literacy both between and within departments" (Pinfield, 2001). There are difficulties with using proprietary software for items being deposited into a repository for what is intended to be the longer-term (Barnes, 2006b). Issues such as Microsoft Office Word 2007 not being backwardly compatible to previous versions of Word illustrate the difficulties of using this software in a long-term storage capacity. One way of addressing this is to ask authors to convert their documents to a pdf before depositing them. An open-access software program is currently being developed in Australia to automate these conversions (Barnes, 2006a) but until this is operational and deployed, the alternative is to provide a staff member to assist with the conversion and depositing process.

As mentioned earlier, the issue of the logistics of copyright is one that must be addressed for open access to be successful. As discussed above, many publishers do allow archiving of pre- and/or post- prints and there is a website researchers and administrators can use to determine publisher copyright policies[xxviii], however most researchers appear to be unaware of this. There is also the complicating factor of a changing publishing market, where larger publishers are often buying smaller and independent titles. The self-depositing status of the author of a paper that was published under the imprimatur of a publisher that is now owned by a new company remains somewhat unclear. Self-depositing, while in principle a simple task, can be more complex than it at first appears.

In the case of the University of Toronto, which launched T-Space in early 2003, the decision was made to employ a person 12 hours a week to digitise print documents and converting files into Adobe's pdf format, checking copyright and sending out permission requests to publishers: "The library's decision to perform archiving is intended to maximize the workload of the faculty, to fill the repository quickly, and to learn about the range of issues that may arise as a result of diverse types of submission" (Chan, 2004, p. 288). The T-Space repository contains over 16,000 items in November 2008, and a quick calculation based on the 'browse by date' facility[xxix] indicates that there was a surge in deposits in 2004 and 2005 with over 2200 items deposited in both years.

Deposit mandates

Several commentators in the open access debate argue strongly for the need to mandate self-depositing at a national or institutional level, rather than relying on individuals to make the decision to do so (Harnad et al., 2004a; Law, 2006; Sale, 2007b). In 2005 several significant funding bodies released policies requiring or requesting grant recipients to deposit any papers resulting from their grants in a publicly accessible digital repository. In October of that year, two mandatory policies came into effect in the UK. The Wellcome Trust, which grants funding that produces approximately 3500 papers a year, stated that "copies of the final manuscripts of all authors' research papers, supported in whole or in part by Wellcome Trust funding, must be deposited in PubMed Central as soon as possible, and no later than six months after publication" (Wellcome Trust, 2005). This statement is in line with its position statement in support of Open Access Publishing (Wellcome Trust, 2004b). The Research Councils of the UK (RCUK) released a policy effective the same date stating that all grant recipients should deposit a copy of any resulting work in an appropriate e-print repository (Research Councils UK, 2005b).

The Scientific Council of the European Research Council (ERC) distributes about 15% of the European Union research budget. In December 2007, the ERC (2007) issued a mandate to make both data and articles funded by the ERC open access. This is the first European Union wide mandate. From April 2008, the National Institutes of Health (NIH) in the US has required investigators to deposit their articles stemming from NIH funding in the NIH online archive (Association of Research Libraries, 2008). This field is constantly moving and new initiatives are being announced on a regular basis, such as Harvard University mandating that all research be available in open access format (Darnton, 2008).

Certainly non-mandated requests for repository use do not result in uptake of repositories on a large scale, as demonstrated in the US where a 2005 'request' that researchers funded by the NIH deposit copies of their work into PubMed Central (National Institutes of Health, 2005) was met with limited success, by 2007 only 10,000 of the as many as 65,000 articles derived from NIH-funded research, were available at PubMed Central. Surprisingly, authors sent in only 4% of articles compared to 10-12% submitted by publications (Biello, 2007). The NIH has since upgraded to a mandate requiring deposit within 12 months (Association of Research Libraries, 2008).

As at September 2008 there were five institutional mandates in place in Australia, QUT, Charles Sturt University, Macquarie University, James Cook University and Central Queensland University. In addition, five other Australian universities have indicated they are intending to implement a mandatory deposit policy (Kennan & Kingsley, 2009). In addition, two major funding sources in Australia have recently` requested the placement of scholarly output into repositories.

Australian research grants are generally funded through two bodies which "encourage researchers to consider the benefits of depositing their data and any publications arising from a research project in an appropriate subject and/or institutional repository wherever such a repository is available to the researcher(s)" (Australian Research Council, 2007a, p. 13; National Health and Medical Research Council, 2007). This development has been welcomed by commentators (Sale, 2007a). The ARC policy goes further, saying that if the researcher chooses not to do so they must include their reasons why not in their Final Report. To some observers, this requirement for a justification of non-compliance has meant, "this effectively converts the request into a mandate" (Suber, 2007a). While this appears to be supporting open access, in reality, the soft wording used (such as 'encourage' and 'consider') means there is currently little imperative for Australian researchers to voluntarily place their work in repositories. However there are indications the Australian Government will strengthen these requirements and there has been a commitment on behalf of the ARC to check compliance of the funding rules (Cooke, 2008).

There is a distinction between institutional repositories and subject-based repositories that is relevant to the discussion here. In the case of institutional repositories, the policies on the selection and retention of material, as well as the general scope and organisation of the repository, is determined by the institution. This stands in contrast to the discipline- or subject-based repository where depositing policies are determined by the research communities. These often develop in an 'organic' manner in response to a specific need in

a discipline (Chan, 2004). Attitudinal research of law and economics researchers has indicated a preference for subject-based repositories over an inter-discipline based archive (Pelizzari, 2003). In 2006 there were many more subject based repositories than institutional ones: "of the estimated 2,200 such digital repositories, only 11% are based around a specific institution or institutional department and approximately 35% are subject based" (Regazzi & Caliguiri, 2006, p. 188). Within the subset of subject based repositories, PubMed Central and arXiv accounted for 84% of all records in that analysis.

A study undertaken at Edinburgh University analysed the research material already held on departmental and personal web pages prior to establishing an institutional repository, and found a direct correlation between "the willingness to self archive and the existence of subject-based repositories. Most of the academic units that have a high percentage of self-archiving scholars already have well-established subject repositories set up in that area" (Andrew, 2003, p. 12).

In summary, despite open access dissemination options becoming increasingly more available, and the existence of various mandates to deposit in repositories, the level of engagement with open access by researchers continues to be low.

Previous research into researcher engagement

There have been several studies looking at the level of uptake of open access. Some of these studies have tried to establish the level of self-depositing through electronic searches of the literature to determine how much has been made available as open access. For example Antleman (2006) undertook an online search of self-deposited articles that had been published in six social science disciplines over an 18 month period and found that authors are self-archiving according to the norms of their respective disciplines rather than following self-archiving policies of publishers. Bergstrom (2007) searched for open access versions of articles published in a set of economics journals and compared these results to those from a similar exercise in political science, finding that about 90% of articles in the most-cited economics journals and about 50% of articles in less-cited journals were available, compared to about 30% of the political science articles which were freely available. While useful snapshots of the uptake of repositories, these studies do not answer the question of *why* researchers are making these publishing decisions.

Bjork (2004) in a review article of the topic, concluded that general awareness of the advantages of open access was a prerequisite for scientists choosing to use open access channels, and that branding and creating a critical mass of users would help encourage

repository use. This article is an example of much of the current research and literature which focuses on the perceived benefits of institutional repositories.

Other research has been in the form of large quantitative surveys. For example a German survey of over 1000 respondents which was undertaken to determine the acceptance and use of open access publications in the German scientific community asked about publishing habits of researchers and their means of accessing information. The study found few people engage in open access, and many have reservations about both open access itself and about spending their research budgets on open access journal publication, but many expressed an enthusiasm for the concept of open access (Over, Maiworm, & Schelewsky, 2005). There have been several other quantitative surveys on this topic, findings from which have informed the discussion above (J. Allen, 2005; Pelizzari, 2003; Pinfield, 2001; Rowlands et al., 2004b, 2006 #775; Swan & Brown, 2003, 2004 #94; 2004b, 2005).

There has thus been considerable research into the 'how many' and the 'who' questions of open access, and particularly repository uptake. Many of these studies have been conducted as internet surveys, which, like mail and telephone surveys, have the limitation of having answers restricted by the choices on the questionnaire, or leading the subjects to make choices based on the structure of the question (Detlefsen, 1998). To date, there has been little work that attempts to answer the question of 'why' scholars are not engaging with open access, and there is a question whether a survey would be appropriate to answer this question. One exception is research by Houghton et al. (2003), which "focused on why researchers do what they do, rather than simply on what they do, because it is only by understanding the evolving needs of leading researchers that we can effectively resource research activities in the future" (p. ix). That work was an examination of evolving work practices and their implication for scholarly communication and outlined a coherent agenda for the evolutionary development of a scholarly communication infrastructure.

Brown (1985) states that structured questionnaires are a useful research procedure for establishing what people have experienced. In this type of research, the investigator attempts to explain the relationships found in the questionnaire responses. He goes on to argue however, that "enabling the respondent to provide his or her own account of why events occurred may often bring to light aspects that may remain invisible when looked at in a traditional way" (p.220).

There have, nevertheless, been few studies which have taken a qualitative approach to the issue of research engagement with open access. One example is a study which consisted of semi-structured telephone interviews with 28 randomly selected international authors who submitted to the BMJ in 2003. It investigated attitudes towards open access publishing and author charges (Schroter, Tite, & Smith, 2005). This study found that while almost all participants supported the concept of open access, few had submitted to an open access journal and this was because of a combination of a lack of awareness of which journals publish as open access, concern about journal quality and a dislike of the concept of charging authors for publication.

The best estimates of Australian participation in open access come from large international studies which include a small number of Australian researchers (Primary Research Group Inc, 2007; Rowlands et al., 2004a; van Westrienen & Lynch, 2005). These numbers alone do not give any further indication as to why these researchers are generally not embracing open access.

There are some indications that looking at different disciplines would be a useful approach to understanding the problem. One example is an indepth paper by Kling (2000) which refers to the "social practices that support trustworthy communications in diverse scientific disciplines" (p.1315). Given that the research question is concerned with communication practices, the differences in publication behaviour between disciplines is highly relevant. This, however, has not been a focus of much of the literature in this field. "Unfortunately much of the literature about scholarly e-publishing homogenizes the character of publishing" (Kling & McKim, 1999, p. 896). Kling notes that there is little understanding between disciplines of differences in publishing. For example, while humanities disciplines value books as a publication forum, the lab sciences typically devalue book and book chapter publication. This is an important issue, and should be addressed.

It is clear therefore, that the key to the success or otherwise of open access in the future is the individual scholar. In particular, a focus on their disciplinary practices has the potential to contribute to understanding the problem. Differences between disciplines have been recorded in few instances, and these are elaborated further in Chapter 4. This thesis therefore addresses these issues and informs the open access debate in an area that has, to date, been somewhat neglected.

Summary

Scholarly communication, while a billion dollar business, is ostensibly a tool for scholars to share their research findings, and for research to build upon itself. This tool has, however, become less effective since the Second World War and the subsequent explosion in scientific publishing. The literature indicates that open access offers a solution to the broad criticisms of the scholarly communication system listed in Chapter 1 and to each of the issues identified in Chapter 2. Despite this, the open access dissemination options currently available to scholars, open access journals and repositories, are not being embraced by the academic community.

A broader view of the communication practices of scholars is needed to understand the motivations behind the publication choices they are making. This thesis picks up the argument of Houghton et al. (2003)that:

> It will be essential to take an holistic approach to 're-engineering' the system, which treats the creation, production and distribution of scientific and scholarly information, the management of information rights and access, systems of evaluation and the underlying infrastructure as parts of a single research information infrastructure and scholarly communication system (p. 127).

While there have been many studies to date surveying researcher attitudes, and there has been strong aggregate data compiled describing publication practices, there has been very little attention paid to the holistic view of the researcher and how he or she communicates with all members of his or her working community. Until this is established it will not be possible to truly understand a researcher's motivations, and therefore not possible to address the underlying reasons for the to-date low uptake of open access dissemination options. An important and neglected area of exploration is that of disciplinary differences. There is also a lack of information about Australian researchers more generally.

This research therefore addresses this problem by asking: "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?" The work is focused on the individual scholar as the key to change. Scholars are the catalyst for, and the providers and users of scholarly communication and any change to the scholarly communication system, such as a move to open access, will need to be embraced by the scholarly community. The following chapter will describe in detail the research design used in this research.

Chapter 4 -
Research design

Introduction

As Chapter 3 has demonstrated, even allowing for a lack of awareness of open access in the academic community, there appears to be a divide between people's belief in, and professed support for, open access and their willingness to adopt the behavioural change that will make it happen. Despite the widely published benefits of having scholarly literature openly accessible, the level of uptake of open access dissemination remains low in the international academic community. Australia is no exception and this study aims to discover why researchers in Australia are not embracing open access by asking: "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?"

As indicated in Chapter 3, this research focuses on the individual academic. The study is concerned with Australian researchers and their publication decisions. Determining engagement with and attitudes towards open access is only part of what the research is designed to uncover. It takes a broader view of the scholarly communication process and investigates how individual researchers view their refereeing responsibilities, how they search for information and how they decide where to send their papers for publication. Therefore, the more detailed questions that will be addressed are:

- What is the general awareness and use of open access by Australian researchers?
- Is there a reason other than lack of awareness for the non-uptake of open access options?
- What factors do researchers consider when choosing a publication output?
- How do researchers find the literature they use in their work?
- Is copyright a consideration for researchers?
- Do funding requirements have an influence on publishing behaviours?
- What is the level of satisfaction of the current peer review system?

This research uses grounded theory but begins with some premises drawn from previous work. Despite the understanding that in grounded theory, the theory emerges from the research, studies using grounded theory often begin with some premises, however quietly

whispered (Silverman, 2001). In this instance, the first premise is that the reason Australian researchers have yet to embrace open access communication is not simply because they are unaware of it, but because the means to achieve open access run counter to their scholarly communication norms. The second premise is that the reward system in academia is a considerable part of the larger picture. The third premise is that an important element in the uptake of open access is the individual researcher. This thesis is not questioning whether open access should be a considerable part of the future of scholarly publishing.

This chapter describes in detail the approach used for this research. The research was qualitative, based on the conclusions reached in Chapter 3. There is also a description of other factors affecting the decision-making when choosing the methods of this study. The chapter includes a comprehensive description of how the people selected for the study were sourced, as well as a description of the steps taken in the analysis of their responses. There is a description of the triangulation study that was completed in order to consolidate some of the ideas emerging from the analysis. The chapter concludes with an acknowledgement of the limitations of this study design.

Overview of the research

This research explores researcher behaviour, and this is a good example of the type of phenomena "that are difficult to convey with quantitative methods" (Strauss & Corbin, 1990, p. 19), but whose intricate details can be uncovered by the use of qualitative methods. Qualitative methods can be used to gain novel and fresh slants on areas of research that have already been studied in other ways. The broad research question of this thesis is attempting to uncover the nature of researchers' experiences with scholarly publication.

This research is focused on trying to understand the process of changes to the scholarly publication system. 'Change and process' studies usually begin with questions about what is happening in a given situation and are often grounded theory studies (Morse & Richards, 2002, p. 55). This research is not attempting to test a hypothesis about reality, but is trying to determine how the 'actors' in this scenario (researchers in universities) interpret reality (Suddaby, 2006). This attempt to understand change and process reflects the grounded theory approach: "taking the perspective that reality is negotiated between people, always changing, and constantly evolving … the methods of making and analysing data [in grounded theory] reflect a commitment to understanding the ways in which reality is socially constructed" (Morse & Richards, 2002, p. 54).

The main purpose of using the grounded theory method is to develop theory. To do so the research process needs a research question or questions that give the flexibility and freedom to explore a phenomenon in depth (Strauss & Corbin, 1990, p. 37). The question "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?" is deceptively simple, masking the complexity of the topic. The number and range of questions that were used to attempt to elicit this information gives an indication of this. The next section describes several possible research method options and their appropriateness for this research project.

Literature analysis

One method of data gathering is a literature analysis. This is separate from the literature review already conducted in this study, which has informed the research question and is detailed in the Chapters 2 and 3. When considering undertaking a literature analysis, the obvious issue is the amount and type of literature available to the researcher. Given the subject matter of research in the area of scholarly communication, the potential literature is vast – the entire published output of the Australia academic community for a given period of time. However, in terms of open access issues, an analysis of this information alone would only provide a guide to the level of uptake of open access in Australia.

There is some scope for a small literature analysis in a study focused on the motivations of particular researchers. Patterns such as a tendency to publish in certain journals, or choosing open access journals (and whether they are aware of these or not) provide either a starting point for an interview or an interesting background for a survey. In addition, the availability of a particular academic's publication list – be it on an individual website, a departmental website or sent as an attachment - gives an indication of how openly accessible the researcher's publications are outside the subscription system. Therefore the research design has included a request for a publication list from every academic contacted.

Observation and interviews

The research design of this thesis has drawn on work undertaken at the University of Rochester that aimed to "understand the current work practices of faculty in different disciplines in order to see how an IR [institutional repository] might naturally support existing ways of work" (Foster & Gibbons, 2005). Work-practice studies, they state, generally "spend long periods of time with the people under study, observing them as they conduct the usual tasks associated with their work". Often videotape is used for later analysis. Foster and Gibbons determined in their study that it was not feasible to spend long periods of time taping and observing their academic subjects. They opted for hour-

long interviews, which were videotaped, and supplemented this data with information gathering and telephone interviews.

The focus of this research is slightly different from that of Foster and Gibbons. The specific activities that academics do that are of interest and relevance to the research questions in this study are searching for information, writing papers and reviewing papers, all of which involve cognitive work rather than action. To observe and understand what researchers were doing and why, it would be necessary to interrupt constantly to ask motivations for certain behaviours. This would be highly disruptive to the subject, and it would be unlikely that more than a handful of people would agree to participate. For these reasons observation would be an inappropriate data gathering method.

This research therefore consisted of a semi-structured interview with each of the researchers in their own offices. Semi-structured interviews are used in many different research methodologies including grounded theory (Morse & Richards, 2002, p. 91) and consist of open-ended questions developed in advance, along with prepared probes. Unplanned, unanticipated probes may also be used. The purpose of the interviews in this study is to gain a deeper understanding of the academic's motivations behind their publishing and researching decisions than would be possible by a simple written survey. The study also hopes to understand how deeply the academic understands the link between publication and reward in Australia, and the amount of time each academic spends contributing to the journal publication system.

Pilot study

Grounded theory uses early results and experiences in the empirical process to inform further research, and as outlined in the analysis section of this chapter, the first set of interviews was used to refine the question list for subsequent interviews. By way of a pilot of the questions, I met with a consultant at the Statistical Consulting Unit[xxx] at the Australian National University (ANU) to discuss the question list and determine whether the number of questions were reasonable in the given time (40 minutes). During the meeting, I conducted a pilot run, by interviewing the consultant following the question list as it stood. This consultation demonstrated the need to reorganise the questions so any mention of the expression 'open access' or 'institutional repository' occurred at the end. The issue of the order of the questions is discussed in detail later in this chapter. It was also clear after this interview that I needed to have a standardised definition of open access and institutional repository to give to those people who were unfamiliar with the terms.

Influences on the research design: a personal perspective

Some of the background knowledge informing this research design was not obtained from previously published research, but instead was a mixture of informal interviews and personal experiences. Described below, the attempt to 'immerse' myself in the topic at hand by various means was a deliberate research tactic. This technique, of using personal experiences, general knowledge and the stories of others is described as 'anecdotal comparison' (Glaser & Strauss, 1967). These comparisons can be "especially useful in starting research and developing core categories. The researcher can ask himself where else he has learned about the category and make quick comparisons to start to develop it and sensitize himself to its relevancies" (p. 67).

In order to gain an insight into the repository situation within Australian research institutions, in 2006 I accepted a one-year, part-time position at the Australian Partnership for Sustainable Repositories (APSR)[xxxi] in 2006. APSR was one of four programs funded by the federal government under the Systemic Infrastructure Initiative, administered by the (then) Department of Education Science and Training (DEST). The stated aim of APSR was to 'establish a centre of excellence for the management of scholarly assets in digital format'. Based at the ANU, the partnership consisted of four research universities (the ANU, the University of Queensland, the University of Sydney and the University of Melbourne), the National Library of Australia and the Australian Partnership for Advanced Computing (APAC).

APSR was housed in one of the ANU libraries, and many of the staff had previously worked in the Division of Information, many in the library. This meant that I was in close contact with those staff responsible for the ANU repository. My role at APSR within the National Services Program meant I was involved in the planning and execution of several workshops and I attended these and other meetings around Australia. This afforded me the opportunity to meet with many people in Australia and New Zealand who were involved in the development and advocacy of repositories, and discuss their experiences in an informal setting.

In addition, I was involved in the publication of several project reports and papers relating to the work undertaken at APSR (2007; Henty & Kingsley, 2007). The papers that resulted from empirical data had looked at a particular aspect of the development of institutional repositories. However, there were areas of this data that had specific relevance to my own

research, despite being gathered with a different purpose in mind. While I will not be using this APSR data directly, my thinking and conclusions have been affected both by my experiences working at APSR and by the research I undertook while a staff member there.

Because the topic of this thesis encompasses the writing, publishing and reviewing of academic literature, it would have been remiss not to have attempted to take part in this process once I had obtained publishable data. Concurrently with researching for and writing this thesis I was able to publish several papers, both as a joint author and as a solo author (Clarke & Kingsley, 2008; Kennan & Kingsley, 2009; Kingsley, 2007, 2008b; Steele et al., 2006). In doing so, I experienced many of the problems with the scholarly communication system as discussed in Chapter 2 including delays in publication of over a year in one instance. The peer review of each of these papers was of varying rigour (ranging from what appeared to be a perfunctory glance by the editor on one paper, to two fully referenced and highly constructive reports on another).

In one instance I submitted a paper (on invitation) for the inaugural issue of a journal focused on open access research, and was only informed that the journal was not proceeding due to an 'underwhelming lack of interest' because I followed up the editor six months later. This article was altered and resubmitted to another journal, but during the review process, there was a change of government in Australia, which meant the section discussing the Research Quality Framework[7] was immediately out of date. The paper was declined. I am in the process of reconfiguring the paper to resubmit it to a journal with a different focus. By publishing papers, I also had the experience of depositing my post-prints into the ANU's repository and having feedback from colleagues who were able to access my written material using this tool.

I have also had mixed experiences with conferences. In one instance I submitted, had accepted and presented a peer-reviewed paper to a national conference (Kingsley, 2008a). I also submitted and had a paper accepted for a peer-reviewed conference held in the USA in June 2007. Due to technical difficulties with the conference website, it was not until days before departure that the conference program was available, at which point it became obvious that the focus of the conference had changed from the original promotional material. I withdrew at the last minute. This experience reflected some of

[7] The Research Quality Framework (RQF) was a planned change to the funding system in Australia which was due to be implemented in 2008, however the federal government changed after a November 2007 election and the RQF was abandoned.

those described by interviewees and while conferences had not originally been an area of great interest for the research topic, my experience reinforced some early conclusions I was making from the data. This is one concrete example of how my broader experience has informed the discussions and observations made in Chapter 7.

As I discovered in the interviews, all of the above experiences are not uncommon and most published researchers would be able to describe at least one of those experiences during their publishing career. Therefore, experiencing the academic publishing system first-hand has given me a much greater insight and understanding of the situations participants described to me in interviews. It also provided a "resource for assisting respondents to explore and describe their circumstances, actions and feelings. Indeed, citing shared experience is often a useful way of providing concrete referents on which inquiries and answers can focus" (Holstein & Gubrium, 1995, p. 45).

This technique, of a social scientist acquiring an understanding of the field being observed, has been described as "informed observation", and offers advantages over "naive observation" (which is difficult to maintain) and "native observation" where a scientist in a field becomes a social scientist later, which blurs the distinction between observer/interviewer and participant (Laudel & Glaser, 2004).

In terms of the interview process itself, my professional background is as a science journalist and communicator. Over 12 years in this area of work I have interviewed literally hundreds of scientists about their research. This experience was very helpful in terms of the innate skills an interviewer needs during an interview, such as indicating to the subject my own level of expertise and therefore how complex they need to be in their answers. This issue of negotiating the level of communication is discussed in Laudel and Glaser (2004, pp. 20-23). However, an interview conducted as a journalist to gain information for a story is very different to a research interview, and in many ways I was a novice to the research interview.

This concludes the discussion about the thinking and research that formed the background to the study design. The remainder of this chapter will look at the design of the study itself and how it was conducted.

Study design

The aim of this study was to explore the influences on scholars' publishing and researching behaviour. Three primary sources presented themselves: the administrative

procedures at their institution, the funding system that all scholars operate within in Australia, or influences from the behavioural norms within their discipline. It was important to explore all three, plus other unanticipated factors.

Once the technique of data gathering was established, it was necessary to determine how to sample the loosely defined group of 'researchers in Australian higher education institutions'. As a qualitative study, this was not a random sampling issue, which attempts to gain a representative group without bias. It was, however important to obtain valid representation. There are four options: purposeful sampling, nominated or snowball sampling, convenience sampling or theoretical sampling (Morse & Richards, 2002, p. 173). Of these, the final two were the most relevant. The next section outlines the theory behind the sample group that was chosen.

The institutional influence

Originally I considered a survey of all ANU science researchers, but once it became clear that this research question would be better served by interviews rather than surveys, the potentially large uptake of this group put the size of the study beyond the resources available to it. After some consideration, I decided that one way of establishing if the procedures in place at an institution affected a scholar's publishing behaviour was to compare the publishing and research behaviours of scholars at two Australian higher education institutions, reflecting the transferability of the research (Marshall & Rossman, 1995). The chosen institutions were the ANU and the University of New South Wales (UNSW). One reason for the decision to compare these particular universities was the disparate status of their institutional repositories.

ANU e-Prints was the first institutional repository in Australia. It has been in existence since 2001 and contains nearly 3,000 items. An open source software package, ePrints was created to allow for the deposit of author pre- or post- prints to facilitate open access to the material without the reader having to pay a subscription fee. In 2005, the ANU launched Demetrius[xxxii], a repository built on DSpace, incorporating the ePrints collection as a 'community'. DSpace has a wider remit than ePrints, archiving a range of digital content including images, datasets and other forms of scholarly output (Nixon, 2003).

The UNSWorks[xxxiii] repository was still in an experimental stage at the end of 2006. This repository was part of a national research project called ARROW (Australian Research Repositories Online to the World), which began in 2004 and was another of the four projects funded by the Systemic Infrastructure Initiative. ARROW's remit was to identify

and test software or solutions to support best practice institutional digital repositories. ARROW used Fedora, another open source software platform as a base for developing a proprietary software system called Vital. At the time of my interviews with UNSW staff, the repository had not been launched and no advocacy had been undertaken to increase awareness of the repository at UNSW.

It should be noted that both UNSW and ANU are well funded research intensive universities, so are ideal for the purpose of obtaining interviewees with high publication rates. However the similarities of the universities does cause some limitations to the generalisation of the results, and these are discussed in depth later in the chapter.

The funding influence

In order to attempt to address the issue of whether research funding in Australia was affecting a researcher's publication decisions, I decided to exclude Emeritus (retired) Fellows and Professors, and Visiting Fellows, as these groups are not funded as academic staff members of the university. For the same reason, and because generally PhD students are unlikely to have a publishing record, they were also deliberately excluded from the sample.

The disciplinary influence

The third potential influence on researchers' behaviour was their discipline. Given both the differing nature of research fields and the different techniques used to undertake that research across all academia, it is reasonable to assume that members of different disciplines all have their own disciplinary norms. This research is concerned with the communication practices of individual researchers, and specifically differences in publication behaviour between some disciplines is documented (Kling & McKim, 1999, p. 896). It was evident that the most logical way of determining whether disciplinary norms affect publication behaviour was to compare disciplines.

Revisiting the literature, it became evident that in the literature discussing open access, there is very little by way of discussion of disciplinary differences *itself* as a field of enquiry. Certainly several studies on researcher attitude discussed in Chapter 3 have canvassed researchers from different fields without distinguishing between them in the analysis (T. Bergstrom & Lavaty, 2007; Cozzarelli, Fulton, & Sullenberger, 2004; Gadd et al., 2003; 2006; Rowlands et al., 2004b; 2004a, 2005).

Research into open access engagement which has specifically looked at differences between disciplines is somewhat limited. There are only a few studies and many of the

disciplines studied have been in the humanities and social sciences. Allen (2005) compared the attitudes and behaviours of researchers from different disciplines in the humanities towards depositing their work in institutional repositories and Kling (2000) attempted to create a theory of how scholarly fields adopt and shape technology in the context of scientific communication. The two other studies have taken an approach of comparing the use of technology across disciplines. Antleman (2006) undertook an online search of self-deposited articles that had been published in six social science disciplines and Talja (2004) looked at how environmental biologists, nursing scientists, historians and literature and culture studies scholars used mailing lists, showing the differential role of formal and informal computer-mediated communication across fields.

Overall in the open access literature there has been little discussion of disciplinary differences as a phenomenon which may determine the engagement of an academic with open access dissemination options. Because of this situation, I will take a slightly unorthodox path and incorporate a brief review of disciplinary differences literature here to inform the design of the research.

Choice of disciplines

The research design builds on a large body of literature looking at disciplinary differences (Becher, 1981, 1994; Fry, 2006; Sparks, 2005; Walsh & Bayma, 1996; Whitley, 1984).

In choosing the three disciplines for this research, Chemistry, Sociology and Computer Science, the initial consideration was for the way the disciplines publish their work. Having separate communication systems is one of the conditions for establishing scientific fields as distinct systems of work. As mentioned in Chapter 3, the others are: "a) scientific reputations need to be socially prestigious and to control access to critical rewards, [and] b) each fields (sic) has to be able to set particular standards of research competence and craft skills" (Whitley, 1984, p. 29). Chemistry, representing a hard science, traditionally publishes in peer-reviewed articles in journals. Sociology, while also publishing in this manner, has an attendant tradition of publishing books or monographs, while Computer Science primarily uses conference proceedings for peer-reviewed communication.

While generally researchers can be described as people who work with ideas, the nature of the particular intellectual tasks on which specific groups are engaged determines to some extent their 'culture'. The divide between disciplines is not limited to the subject being explored. It extends to all aspects of the research endeavour, the language used, the methods of communication and the sources of information, to name a few.

Disciplines themselves are hard to define, but to be admitted to membership of a section of the academic profession "involves not only a sufficient level of technical proficiency in one's intellectual trade but also a proper measure of loyalty to one's collegial group and of adherence to its norms" (Becher & Trowler, 2001, p. 47).

Each of the three disciplines explored in this research can in turn be broken into many sub-disciplines. Chemistry is a heterogenous discipline with several major, distinct subfields, each with different work modes (Walsh & Bayma, 1996). Chemistry is primarily a bench science, meaning of the three disciplines chosen for this work, the chemists were the only group whose work involves sharing some costly component of basic apparatus. In the case of Sociology, due to the structure of the Sociology departments, several anthropologists were included in the interviews. This is a separate discipline altogether, despite sharing some publication behaviours with Sociology. A general distinction is that sociologists use methodology, as an 'instrument of science', whereas anthropologists experience fieldwork and interpret through cultural meaning (Becher & Trowler, 2001, p. 61).

Using the discipline of Computer Science in this research is complicated by the way the faculties or departments are defined within the institutions attended. At UNSW the School of Computer Science and Engineering is housed in the Faculty of Engineering. The Computer Sciences Laboratory at ANU is housed under the College of Engineering and Computer Science, and the Department of Computer Sciences at ANU is within the Faculty of Engineering and Information Technology. Therefore at both institutions both engineers and scientists are employed under the banner of 'Computer Sciences'. It is important to recognise the clear distinction between engineers and scientists. In very general terms, engineers use knowledge to produce end-items and there is often monetary reward, which is outside the social system of academia. Scientists, however contribute to their field with new knowledge, under a reward system of collegial recognition through publication (Pinelli, 1991).

Another compounding factor in the disciplines chosen was that the ANU has a Research School of Chemistry and a Research School of Information Sciences and Engineering in addition to the Chemistry Department and Computer Science Laboratory. In both disciplines I approached the researchers in the Research Schools and the Departments. In theory, researchers employed within the Research Schools do not have a teaching load so

their time is more focused on research. In reality, as the results show, many of the people interviewed under these employment conditions were still heavily involved in teaching.

Publishing norms in the three disciplines chosen

Disciplinary publishing differences extend beyond the output format and include policies towards depositing material into repositories or on websites. Chemistry, for example is a traditional, 'hard' science and its practitioners tend to publish almost exclusively in journals. The restrictive approach to publishing in Chemistry is reflected in the policies of the American Chemical Society (ACS) which has at times tried to ban scholarly electronic publishing (except in the form of society-sponsored electronic versions of existing paper publications) (Kling & McKim, 1999, p. 894). The wording has softened a little since their 1997 statement about electronic publication, but the revised 2004 statement still has a punitive approach. The ACS Editors Policy on Papers on Preprint Server now reads:

> A preprint will be considered as an electronic publication and, according to positions taken by most editors of ACS journals, will not be considered for publication. If a submitted paper is later found to have been posted on a preprint server, it will be withdrawn from consideration by the journal (American Chemical Society, 2004).

There is resistance to electronic publication of pre-prints in the European Chemistry community too, with the European Journal of Inorganic Chemistry stating: "Any manuscript already available on personal/group web pages will be considered by the editors as already published and will not be accepted" (Wiley Publishing, 2008).

By comparison, the Association for Computing Machinery's (ACM) copyright policy, states: "Authors must transfer copyright to ACM upon acceptance. Immediately after acceptance, authors must incorporate the ACM copyright notice and ACM citation of the publication into copies they personally maintain on non-ACM servers" (Association of Computing Machinery, 2002). They also expressly provide a copyright licence back to the author. This acknowledges the widespread practice in computer science of researchers maintaining personal copies of their publications on websites. In Computer Science, conference articles are treated as:

> significant forms of publication, and computer science journals are more likely to republish amplified versions of a conference article. In contrast, natural scientists insist that journal articles are the primary form of significant publication, and their best journals do not publish amplified versions of articles that have previously been published in very obscure journals (Kling & McKim, 1999 p. 890).

Computer Science has long had difficulty having its publication structure recognised by university administrations. In 1994, the National Research Council (US) commissioned a report on the academic careers of experimental computer scientists and engineers. Among other conclusions, it stated that: "the committee also found that publication practices in ESCE [Electrical, Computer and Systems Engineering] emphasize conference publication over archival journal publication, a fact likely to be negatively interpreted by the "paper counters" of university promotion and tenure committees" (National Research Council, 1994, p. 60). The report found this 'negative interpretation' had resulted in researchers changing their publication practice: "a large majority of the researchers surveyed also indicated their belief that journals were much more effective in gaining university recognition. Most indicated that the reason for this was that university administrators put more emphasis on journals; very few indicated that journals had higher prestige or greater impact" (p. 63). The status quo has not changed. In 2006 this report was given to me by one Computer Science interviewee who stated that he had also recently given it to the Pro Vice Chancellor to explain how they publish as a discipline. This is discussed in Chapter 6.

Sociology can be classified as a social science, and while there appears to be no specific policy for the deposit of sociology articles into repositories by the American Sociological Association, the Reprint Permission page does state

> Online use is limited to a secure or password protected server for a maximum of one year; digital rights management (DRM) should be utilized to prevent unauthorized reproduction. Posting for longer than one year requires an additional request and payment of an additional fee[xxxiv]

but it is unclear if this refers to the author's version of the article. However, some historical clues may be gained from the policies of another social science. While the American Psychological Association currently demonstrates an acceptance of researcher's wishes to deposit by allowing authors to place a copy of their work onto their own or their employer's website, provided certain conditions are met, including the ambiguous condition that: "APA does not permit archiving with any other non-APA repositories" (American Psychological Association, 2002), this was not always the case. The Association's apparently 'widely publicised' policy in 1996 made the rather alarming statement:

> Authors are instructed not to put their manuscripts on the Internet at any stage (draft, submitted for publication, in press, or published). Authors should be aware that they run a risk of having (a) their papers stolen, altered, or

> distributed without their permission and, very importantly, (b) an editor regards such papers as previously "published" and not eligible as a submission—a position taken by most APA journal editors (quoted in Kling & McKim, p. 893).

This type of statement may go some way to explaining the wariness of some researchers working in social sciences towards the concept of placing their published material online.

Obtaining the interviews

In Australia any research involving humans is required by law to be approved by a Human Research Ethics Committee, under *The National Statement on Ethical Conduct in Human Research* (2007)[xxxv]. A human ethics research application for this research design was submitted on 1 June 2006. It was given the protocol number 2006/164 and was approved by the Chair of the Human Research Ethics Committee, Prof Lawrence Cram on 30 June 2006. In keeping with my ethics protocol, every person interviewed filled out a consent form, indicating their responses would be kept anonymous, that they could withdraw at any time. A copy of this form is attached as Appendix 1.

Once I had determined that I was intending to interview researchers at ANU and UNSW, I arranged a meeting with two people at the UNSW library on the 27 July 2006 about the development of the UNSW repository and how the university was approaching the impending roll-out of the repository. I followed up this meeting with an email asking the best way to approach staff to request their involvement. They indicated that I should initially approach the Research Office and the heads of department.

In order to ascertain the best way to approach the staff in each department, and to obtain any background information that could be helpful to my interviews I sought to meet with each relevant department head at both universities before approaching the staff directly. With the exception of Computer Science at UNSW and Chemistry at ANU where I was unable to make an appointment, these interviews helped me understand the particular pressures on and situations of the researchers in those departments. Appendix 2 has an outline of the process I followed to choose and invite participation in each department.

Preparing the questions

The literature review concluded that there was a gap in the literature, in that, there has been very little attention paid to the holistic view of the researcher and how he or she communicates with all members of his or her working community. It is necessary to establish this view to truly understand a researcher's motivations, and address the

underlying reasons for the to-date low uptake of open access dissemination options. The literature review also identified the area of disciplinary differences as an important and neglected area of exploration, and a lack of information about Australian researchers more generally.

This research addresses this gap by asking: "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?" The work is focused on the individual scholar as the key to change. Scholars are the catalyst for, and the providers and users of scholarly communication and any change to the scholarly communication system, such as a move to open access, will need to be embraced by the scholarly community.

The purpose of the interviews was to gain a deeper understanding of the academic's motivations behind their publishing and researching decisions than would be possible by a simple written survey. It was also designed to understand how deeply the academic understood the link between publication and reward in Australia, and the amount of time each academic spends contributing to the journal publication system.

Preparing for the interview

Qualitative interviews require a depth of understanding of the topic that is not achievable without being familiar with the interviewee's perspective (Laudel & Glaser, 2004). In addition to the general information gathering about each discipline, specific work was required to gain better understanding of each interviewee. This is in keeping with good interviewing technique: "Know the interviewee. If at all possible, as it usually is, learn as much as you can about the person to be interviewed." (Bingham & Moore, 1959, p. 65) The email sent to the researchers asking them to participate mentioned that I would be asking for a copy of their publication list, which I did when in email negotiation about the date and time of the interview. These lists gave me several background clues prior to meeting with the interviewees. In some cases the interviewee did not have a publication list available and wrote one in the body of a reply email. Others sent sections of a Word document without any identifiers on it as to what the document was. Several interviewees did not send anything through, although in most cases this was rectified at the time of interview.

This background knowledge allowed me to "move from the hypothetical or abstract to the very concrete by asking questions about relevant aspects of respondents' lives and experience, a particularly fruitful tactic for promoting circumstantially rich descriptions,

accounts, and explanations" (Holstein & Gubrium, 1995, p. 77). Because this research is looking at the relationship the researchers have with the scholarly literature, observing the way individuals presented their publications was a helpful way to prepare for the interview. I was able to individually tailor my questions about awareness of open access, copyright or the relationship between publication output and the reward structure based on these pre-interview observations.

When an interview was scheduled, I looked up the interviewee on their university website to see what publicly available information existed about them. If there was an online publication list, I checked to see if any of the papers were linked to an openly accessible version. Because all correspondence has been via email, I had no indication (other than their position in the department) of the interviewee's age. In some cases I had no idea of their sex either. In cases where the university (or the interviewee's personal) web page provided a photograph, this gave me an inkling of what to expect.

In each interview I began by speaking about my research, describing in general terms what I was hoping to achieve with the research, and to give them an idea of the area the questions would be covering. A transcript of this introductory sequence from one interview, which was fairly typical, is here:

> … I think if you want to make changes to the way people work you need to have an understanding of their current work practices. So that is sort of what I am doing and I'm trying to get a baseline in the interviews I am doing. So the structure of the research is I am interviewing Computer Scientists, Chemists and Sociologists who each have different ways of publishing their work and I am comparing here [UNSW] to the ANU to see if there is an institutional difference. I suspect that there won't be, I suspect that the differences will be across groups rather than between campuses. So that is the way it is all flowing.
>
> So pretty much what I will be asking about is your interaction with the literature both as a reader and as an author. And I am asking most people to start, just to give me some idea, about how you are working at the moment. I know it is different between holiday time and term time, but about how much of your time is spent in teaching and admin and research?

This first question, it should be noted, is not one that appears in the question list below. In many ways it was arbitrary, simply a way to start the exchange with the interviewee, and to give me some indication of how forthcoming they were likely to be, following the advice that questions at the beginning should be simple and 'factual' in content to assist in

building rapport (DeLamater, 1982). This technique was one of many used, such as the order of the questions explained next, to elicit the richest information from the interviews.

The order of the questions

The success or otherwise of an interview relies on the rapport the interviewer is able to strike with the interviewee. This will take time regardless of the charisma of the interviewer. The order of the questions asked is vital. The literature suggests that questions about threatening topics should not be placed at the beginning of an interview (DeLamater, 1982). I discovered this in the one pilot interview I conducted (discussed above). Using terminology that is unfamiliar to the interviewee can make them feel embarrassed and possibly hostile to the interviewer.

With this in mind, certain questions posed a challenge. As discussed in Chapter 3, most researchers remain unaware of open access dissemination options. The terms 'open access' and 'institutional repositories' were likely to be unfamiliar to the interviewees. I felt that asking direct questions about open access and institutional repositories early in the interview would be unproductive, a position supported in the literature:

> Ask questions at first that are not likely to cause refusal to answer or to provoke any form of negativism. Begin with questions that the interviewee can and is willing to answer. Cooperation is ensured partly by establishing the habit and attitude of answering. Risk questions that may arouse resentment only as a last resort after related questions have failed to encourage him to volunteer the information (Bingham & Moore, 1959, p. 73).

However asking questions about how people looked for information and whether they had problems accessing material, and how they approached issues like copyright, could not only inform my research, but also give an indication whether the arguments being put forward by open access advocates were likely to resonate with the academic population.

Obviously it was necessary to include questions about awareness of, and feelings towards, open access and institutional repositories. Considering Bingham's (1959) advice:

> Do not ask questions directly until you think the interviewee is ready to give the desired information and to give it accurately. … Much of the desired information will then emerge without resort to direct personal questions which sometimes cause resentment or misunderstanding (p. 72)

I included those questions at the end of the list. This meant if the interviewee was unfamiliar with the terms and answered in the negative, it did not bring the discussion to an uncomfortable halt. In practice, those interviewees familiar with open access had

already used the expression in the discussion before we reached that question. This of course, then rendered the later questions unnecessary in that interview.

The other advantage of asking behavioural questions about publishing practice first is there is a distinction between a person's attitude towards a phenomenon and their behaviour towards it. In an interview or survey situation, describing an attitude is open to the risk of 'response bias' where the interviewee altering their responses to give answers they think the interviewer wants to hear (Judd, Smith, & Kidder, 1991, p. 229). Asking an interviewee to describe past behaviour, however is a more concrete request and less open to misinterpretation.

The question with potentially the most fruitful answers was: 'why do you publish?'. In order to elicit the most fulsome responses it was important that by the time this question was asked, the interviewee felt comfortable. Therefore the question appears halfway through the interview, after the discussion about literature searching and some discussion of publication practice. Because I wanted the answers to be broad, I often prefaced the question with a statement like:

> Interviewer – this is quite a broad question and you can answer it however you feel. Why do you publish?

Several people acknowledged the difficulty of the question as this exchange demonstrates:

> Interviewer – OK this is a bit of an odd question so just answer it how you think is appropriate. Why do you publish?
>
> Interviewee - Well I am funded by the public. Well I mean, OK [pause] it is an odd question because there are so many different perspectives to it. And there are multiple reasons.

The area of questioning that was placed right at the end of the interview was about grey literature. This placement was for two main reasons. One was that not all researchers produce grey literature. Some sociologists, for example, do not create data sets as part of their research, so this was not a question that I raised in every interview, unless there was a mention of something earlier to trigger the question. The second reason was that I had indicated that the interview would last for 40 minutes. Generally this time frame was achieved, but in some cases the interviews went longer, and I was aware that prior other engagements may cause the interviewee to stop the interview before we had finished. I

felt that of all the areas of questioning, this was probably the one that could be sacrificed if necessary.

It is necessary to remember, in this discussion of the order of questions, that the interviews were semi-structured. I allowed the conversation to dictate the flow of questions. In cases where the interviewee brought up a topic that had been slated for later discussion, I did not stop them to remain 'on track' with a pre-determined order of questions. This is in keeping with principles of 'active interviewing' (Holstein & Gubrium, 1995), and allowed for an easier discussion and possibly richer information. The remainder of this section discusses each of the questions asked.

The rationale behind the questions asked

The information I was hoping to gain from the interviewees fell into nine general categories: background career information, researching behaviour, publishing behaviour, reward processes, copyright, peer review/editorial responsibilities, questions about open access, publishing in repositories and grey literature. I devised several questions for each of these categories. Not every question was asked in every case, the questions served as a guide to the interview process rather than a script.

Within each set of questions I asked a general question first, followed by increasingly specific questions. The most detailed questions were at the end. This questioning technique adheres to the 'funnel' principle (Judd et al., 1991, p. 246).

Interview questions

The full question list is reproduced below.

Category	Questions
Background career information	1. Firstly, please give me an indication of the spilt of your time between teaching, research and administration. 2. Please briefly describe the research you are currently undertaking – what form does that research take (interviews, observation, experiments, computer work).
Researching behaviour	1. How do you keep up with what is happening in your discipline? 2. How do you decide if an article is worth reading? 3. Do you ever hit barriers when collecting information? 4. Are you satisfied with your current access to the literature? 5. What changes in the past 10 years have you noticed in the way you search and your ability to find things? 6. Do you think the ease of access to a paper affects the choice of papers you use for research? OR: Does a barrier mean you change what you are looking for (finding an article that is easy to get hold of that says essentially the same thing?) 7. How do you go about obtaining copies of the articles you need? 8. Do you send out copies of your work to people? 9. What proportion of your information would come from published literature as opposed to grey literature?
Publishing behaviour – journals	1. Why do you publish your work? 2. Please describe any formal instruction you were given about the publishing process. (If there was none, please describe how you found out what you know) 3. Are you involved in any formal or informal mentoring or training process for young researchers to 'show them the publishing ropes'? 4. Could you explain your choice of the journals you have published in? 5. Have you ever been approached by a journal to publish your work? 6. On average, how often are you accepted by the first journal to which you submit? 7. Have you ever submitted to more than two journals (and if so what was the overall time to publication?)

	8. On average, what has been the period of time between submission and publication – do you have an opinion on that?
Reward processes	1. What is your understanding of the relationship between your publication output and funding? 2. How would you feel about the ARC allocating funds to include Open access publishing or would you rather the money be spent on research applications? 3. Do you have an opinion about any changes to reporting requirements by your university/the government?
Copyright	1. What is your understanding of the copyright status of your academic work? 2. Is copyright an issue you consider? Does the copyright status afforded by a journal affect your choice of publication? 3. Are you aware of alternatives to traditional copyright (such as Creative Commons licence or copyleft)
Peer review/editorial responsibilities	1. Have you ever reviewed a paper? 2. If so how many papers would you review in a year? And how much time would this take? 3. Are you on an editorial board of any journals? How much time does this take up? 4. Is this something you sought or that you were asked to do? 5. Have you been compensated in any way for that work? 6. How do you feel about reviewing (is it a positive or a negative task for you and why?) 7. What are your feelings about changing peer review to an open system, in an electronic context for example?
General questions about open access	1. Are you familiar with the term 'open access publishing'? 2. If so, could you describe open access as you understand it? 3. Do you have an opinion either in support or against open access? 4. Have you ever published in an open access journal? 5. Are you familiar with the 'author-pays' or 'pay-on-submission' model? 6. How would you feel about this becoming the standard publishing model for all journals?
Publishing behaviour – repositories	1. What is your understanding of the term 'institutional repository'? 2. Have you ever deposited any scholarly materials, including pre-or post prints into an institutional repository?

	3. If not, what about on personal or departmental website? 4. If not why not? Would you consider doing so? What would prevent you from doing this? What would encourage you to do this? 5. Have you ever sent out a copy of a pre or post print to colleagues on your own instigation or on request? 6. Are you aware of the deposit permission status of the journals you have published in?
Grey literature	1. Does your research generate any supporting data? 2. What do you do with supporting data for your research? How do you store it? 3. Have you or would you consider placing it into your institutional repository? If so would you put open access status onto it? 4. Have you ever received requests for supporting data? If so how often has this occurred and have you provided the data?

Table 1 - List of questions asked in the interviews

Summary of the interviews

In total, 43 people were interviewed, 20 from UNSW and 23 from ANU. The following table demonstrates how many of the people in each department were approached and how many were eventually interviewed.

Department	Total no of academic staff in department	No. of academic staff (PhD, emeriti and visitors excluded)	Staff interviewed	% of relevant potential interviewees
UNSW Sociology	19	12	5	42%
ANU Sociology	8	8	6	75%
Total Sociology			11	
UNSW Chemistry	25	6	6	24%
ANU Chemistry Department	10	7	1	16%
ANU Research School of Chemistry	22	21	6	33%
Total Chemistry			13	
UNSW Computer Science	94	55	9	16%
ANU Computer Science Laboratory	32	9	4	44%
ANU Research School of Information Sciences and Engineering	27	15	6	40%
Total Computer Science			19	

Table 2 – Numbers of academic staff approached and interviewed in each department

Analysis techniques

All of the interviews with respondents were audio recorded with a minidisk. I also took comprehensive handwritten notes during the interviews, making notes of the time counter from the recorder during the discussion for later reference. These interview notes have been typed up, with reference to the recording when the notes were unclear. This 'clarification' and elaboration' is recommended in the literature (Holstein & Gubrium, 1995). In interviews where my notes were unclear or I had indicated that something was highly relevant, I supplemented my typed up handwritten notes with a partial transcription of the relevant parts of the recording. One example of each category of interview (each discipline at each university, six in total) has been transcribed in full and attached as Appendices 4a-4f to allow readers to see how the questioning was adapted to suit each discipline and indeed each individual. This provision of 'raw' data is suggested by Silverman (Silverman, 2001, p. 69), to allow the reader to separate data from the analysis and is entirely consistent with recommended practice in qualitative research.

The interviews were systematically grouped and descriptions were summarised. This provided a "coherent organizing framework that encapsulates and explains aspects of the social world that respondents portray" (Holstein & Gubrium, 1995, p.79). Then, in order to identify themes within and across the universities and disciplines, each interview was hand-coded using content analysis and coding (Higginbotham, Albrecht, & Connor, 2001, p. 248). This initial coding used a system described by Barbara Chevalier[8], and involves labelling data, looking for categories and simple descriptive coding. The second stage coding, which is structured and conceptual, was undertaken with a mix of NVivo, a qualitative analysis software program, and manually coding quotes. This coding involves moving information into natural groups, looking for patterns/relationships in the code. This in turn allowed for third stage coding where the bigger patterns emerge in the data and the different groups are labelled. In keeping with the grounded theory approach, the analytical codes were self-generated rather than derived from the literature.

The first set of interviews undertaken was with the sociologists at UNSW. I interviewed this group in isolation and then spent some time with my notes from the interviews, conducting a preliminary analysis to ascertain how effective both the questions and their

[8] In a Research Workshop Program called 'Qualitative data analysis and reporting – without software' held at University of Canberra on 7 February 2006.

sequence were. This system also allowed me to see early indications of the issues that were more relevant to the broader research question and to make slight modifications to the question list in preparation for the next set of interviews. This is what is expected of active interviews: "active interviewing takes advantage of the growing stockpile of background knowledge that the interviewer collects in prior interviews to pose concrete questions and explore facets of respondent's circumstances that would not otherwise be probed" (Holstein & Gubrium, 1995, p. 46). These emerging issues identified new reading areas truly grounded in the study, as would be expected (Strauss & Corbin, 1990, p. 53), and these readings then informed the analysis and discussion of this thesis. In particular, information seeking behaviour, disciplinary differences and diffusion of innovations were all important areas of reading that emerged from analysing the interviews.

This complete analysis of early interviews is recommended by Strauss and Corbin (1990, p. 30), as it gives guidance to the later interviews. As the research progressed and the question list became more defined. I was able to interview participants not only from different institutions but also from different disciplines concurrently. I experienced a second shift in approach with the first interview I conducted in the Computer Science department at UNSW. While I had a theoretical understanding that computer scientists publish differently to other sciences (mainly in conference proceedings), I had no personal experience of this. The transcript of that first interview reads very differently to almost every other interview because I was constantly asking supplementary questions to ensure I understood exactly what the interviewee was telling me. The way I approached all the subsequent Computer Science interviews was very different to the approach to the Chemistry and Sociology ones. This reflects the continual coding undertaken in active interviews which "takes places (sic) and unfolds as an integral part of the interview process, not just before-hand or afterwards" (Holstein & Gubrium, 1995, p.56).

This research has followed the general mode of operation in the grounded theory style of analysis described in qualitative study texts (Strauss & Corbin, 1990, p. 30). As the research progressed and the theory developed, the relevance of certain answers in the interviews altered. For example, one area, which did not at the time of interviews seem to be very important, was the information seeking behaviours of the participants. In particular, the search engines, databases and computer programs they used to find literature appears to affect the likelihood of that researcher to engage in searches that will find information stored in institutional repositories. When designing the question list, I did not include a specific question about techniques of searching. I have had to go through

the interviews and pull out the detail in those cases where the participant volunteered that information in the general discussion about literature searching.

One consideration of any research project is the issue of 'saturation' – the point where the field or area of study has been 'covered' in the data collection process. This concept is a difficult one in grounded theory because this type of research "uses iteration and sets no discrete boundary between data collection and analysis, saturation is not always obvious, even to experienced researchers" (Suddaby, 2006, p. 639). While I experienced this iteration, and each interview opened new ideas and possible areas of analysis, I did find that there was some level of repetition in the attitudes and themes coming from the interviews by the time I came to the end of the interview process. That said, it would be an interesting (separate) experiment to re-interview the first group of sociologists to see if my more informed viewpoint would elicit different responses.

In addition, when I returned to the literature with a more informed perspective, the patterns that were emerging from the interviews were reflected in the new areas of the literature I was exploring, such as information seeking behaviour, disciplinary differences and diffusion of innovations theory. This ability to find the patterns in the literature is described as saturation in some qualitative research texts (Morse & Richards, 2002, pp. 174-175). Of course, some of the answers given by interviewees did not fit the emerging model, and it was important to look at these cases to determine if they could together form their own model or if there were alternative explanations for the differences.

Prior to the study, it was hoped that by interviewing researchers in their own offices there would be some further insights into their work practices or way of thinking by observing their surroundings. This also had the advantage of making the interviewee comfortable and providing privacy, as: "the critical problem in an interview is the establishment of sound working relationships" (Bingham & Moore, 1959, p. 65). In practice, the benefits occurred in unexpected ways. (This is symptomatic of grounded theory!) Many of the interviewees offered to demonstrate certain behaviours rather than describe them, and this was possible because they were at their computers. Some questions were answered only after consultation of either electronic or paper files (in some cases both). On several occasions there was some follow-up material that the interviewee wanted to email to me, and they did so immediately during the interview. Leaving this to memory at a later time may have meant that some of these valuable resources would never have been sent. For various reasons several interviews were conducted in neutral premises such as a meeting

room. In these cases, the interviewees were unable to refer to their computers and several commented on this.

Once the main empirical data gathering was complete, a preliminary analysis demonstrated strong themes emerging from the data. In order to establish if these themes were worth pursuing, it was decided at this point in the research to develop a way of triangulating the findings, discussed next.

Triangulation

Triangulation is used in research to help understand a social phenomenon by examining it "under a variety of conditions" (Mathison, 1988, p. 14). In a research project such as this, several triangulation options presented themselves. In designing the research, the number of people who accepted to be interviewed would be limited. An early triangulation option was expanding my sample space to another, different university; originally the plan was to interview people from a non-Group of Eight university as a comparison, discussed below. The difficulty with this was that non-Group of Eight universities are structured very differently from ANU and UNSW. While this would strengthen the findings for any differences between institutions, it would also mean that a direct comparison with the two Australian universities in this study would be challenging and not necessary illuminating.

After discussion with my supervisors it became clear that a more informative comparison would be to undertake a case study of Queensland University of Technology (QUT). QUT was unique in Australia at the time of the interviews in that it had a mandate requiring all researchers to place a copy of the final version of their peer reviewed and corrected papers into QUT ePrints (QUT, 2004). As an example, part of the QUT policy states:

> Material which represents the total publicly available research and scholarly output of the University is to be located in the University's digital or "E print" repository, subject to the exclusions noted. In this way it contributes to a growing international corpus of refereed and other research literature available on line, a process occurring in universities worldwide (QUT, 2004).

This mandatory policy is accompanied by technical and administrative support for depositing researchers from the QUT library. I decided to interview the two people who had instigated and administered the process of implementing this repository.

Interviews were sought on 15 June 2007 and granted with Professor Tom Cochrane, Deputy Vice Chancellor (Technology Information and Learning Support) and Paula Callan, eResearch Access Coordinator from QUT (who undertook the day to day instigation of the

repository deposits). The interviews were conducted on 10 & 11 August 2007. Both spoke at length about the reasoning behind the policy and about specific issues faced with populating their repository.

These interviews were structured very differently to those conducted with the academic participants, as the purpose of these interviews was to determine if the general conclusions that seemed to be coming out of the interviews I had conducted so far were reflected in the experiences at QUT when rolling out their repository. Thus, after reading several reports on the topic (Callan, 2006a; Cochrane & Callan, 2007) the following discussion areas were explored.

The interview with Paula Callan was wide-ranging, beginning with a potted history of the repository from its launch and a discussion of her role in the implementation of the repository. Some time was spent discussing the techniques used to encourage use of the repository, and the success or otherwise of these methods. This led to a discussion about the barriers individuals were experiencing in using the repository, and therefore the reasons researchers are giving for not using the repository. The interview also encompassed a series of statistical questions about the percentage of output of the university that is held in the repository, and download statistics.

The interview with Professor Cochrane began with a discussion of the adoption of a mandate policy at QUT in 2004. The interview then explored the discipline issue, such as why a planned discipline-led approach to building repositories did not work, which disciplines have shown greatest enthusiasm for the repository, and whether this was expected. The issue of whether there is greater benefit to the institution or the individual in using a repository was discussed. The interview concluded with questions about the roll-out of the repository, the decision to 'sell' the repository to staff rather than punish those who do not use it, and what barriers are being experienced by QUT with this approach. A discussion of how these interviews have informed this research is discussed in Chapter 6.

The last section of this chapter will explore the various limitations of the chosen research design.

Limitations in this study design

The limitations in this study are several-fold. Most obviously, the choice of universities and of the disciplines approached to be involved has limited the scope of the study. In

addition, the self-selecting nature of the method of participant recruitment shows limitations.

Choice of institutions

To look at the issue of the university choice first, there is a limited 'generalisability' in these findings - what would appear to be the case from observations of these two universities may not be transferable to other universities in Australia, let alone the world.

This research focused on two Group of Eight[xxxvi] universities. The 'Group of Eight' (Go8) is a term given to a self-selected group of eight universities in Australia that 'represents Australia's leading universities'. Equivalent expressions are 'Ivy League' universities in the US, and 'Oxbridge' in the UK. The Go8 in Australia consists of: ANU, the University of Sydney, UNSW, the University of Melbourne, the University of Queensland, the University of Adelaide, the University of Western Australia and Monash University. As members of the Go8, both ANU and UNSW are well funded with a high research output in terms of publications, and therefore do not represent the range of academic environments in Australia.

The Go8 is only one of four main groupings of Australian universities. These groupings are all self-selected and have been formed primarily to promote the mutual objectives of the member universities. These groupings offer marketing advantages, practical benefits of collaboration, and the increased lobbying power that comes from being part of a group. The other three groups are the Australian Technology Network (ATN)[xxxvii], Innovative Research Universities Australia (IRU Australia)[xxxviii] and New Generation Universities (NGU). Not every university in Australia is represented in one of these groups. Of these other groups, the one of most interest to this research is the Australian Technology Network, because it includes QUT, which was used in this study as a university with which to triangulate. Together with the other members, Curtin University of Technology, the University of South Australia, RMIT University and University of Technology Sydney, QUT shares a common focus on the practical application of tertiary studies and research. The ATN universities were all Institutes of Technology before becoming accredited universities.

Any further study in this area would benefit from taking a broader approach to the institutions chosen, as the empirical work found institutional differences did not appear to be a factor in this research. One of the few studies looking at institutional differences in this context has found that the information seeking behaviour of members of the

university community changes depending on the focus of the university (Nicholas, Huntington, & Jamali, 2007). That study compared a Research Intensive University, a Master's University Medium Size, Research Extensive University and a Master's University Small. The differences tended to be due to the number of academic staff at the university, so a subsequent specific study of the academic communities at different universities would reveal whether the institution itself has an effect on the information seeking behaviours of the academic staff.

The question remains, is this a phenomenon of the particular universities chosen, or is it representative of the wider academic institutional community? As an a example of how broadening the university base would make further study more robust, IRU Australia has a stated aim to incorporate new technologies into their teaching and learning, so it is possible to argue that including a university from this group could provide an interesting counterpoint to the universities studied. In addition, there are many organisations in Australia falling outside of the university category which have staff undertaking research and publication could provide insight into how different organisational structures affect publication behaviour and decision-making.

Choice of disciplines

Another limitation of this study is the disciplines highlighted in the study. It is important to consider when reading the forthcoming chapters that while this study shows clear differences between the three disciplines of Sociology, Chemistry and Computer Science, that the extent of these differences cannot be assumed between other disciplines. While it is likely that the behaviour of researchers in other social science disciplines will be more closely aligned to those of the sociologists interviewed than to Chemistry or Computer Science, this cannot be assumed. It is equally possible that the large differences demonstrated between disciplines in this study are replicated between all disciplines and, therefore, it is not possible to make generalisations about types of research. This conundrum will only be able to be addressed by a more comprehensive study comparing a larger and different set of disciplines.

Individual subjects

The final limiting factor is the individuals who elected to be interviewed. Because no pressure was placed on individuals to participate, those people who chose to participate in the study are, in effect, self-selecting. While the study design determined which disciplines would be approached, it was a matter for the individuals invited to decide to participate. Table 1 indicates that between 56% and 84% chose not to be involved and it is possible that their responses may have differed significantly from those offered by the people who

did choose to participate. Certainly there was a percentage of people interviewed who had a vested interest in the area of scholarly communication, either because they were the editor of an open access journal they were involved in the implementation of the RQF in their department or for personal reasons. These people may not be a general reflection of their colleague's awareness of, or attitudes to, the issues discussed. Unfortunately, this limitation is one that is not easily addressed, and any further similar study will be affected by the same problem.

Within disciplines, a broader scope could also be taken in any future study. Due to the small numbers interviewed in each discipline, consideration was not given in this study to age, or career trajectory. PhD students were deliberately excluded from this sample. Their attitudes and understanding of the publishing system could, however provide some insight into the future direction academia might take. In addition, their searching systems are more likely to demonstrate an electronic bias, which could provide some data to make conclusions about the body of work being used currently, and whether having papers available online does provide an advantage. Any further study could benefit from making a comparison between researchers whose training was before the advent of computers and younger researchers who have only ever used the electronic library.

A final note about potential limitations with this study. An ethical consideration in research involving humans is whether the research would have an impact on the subjects. While this question was answered in the negative in the ethics application, it did open one previously unconsidered line of thinking. By discussing open access and their institutional repositories with participants, I would, in many cases, be playing an informing role. While every attempt could be made to remain objective, the act of the interview could still be perceived to be taking an advocacy role, certainly if the subjects asked questions and wanted further detail (which a few did).

Summary

In keeping with the general 'open access' philosophy, I offered every participant the opportunity to remain informed of any publications or findings that have resulted from this research. Without exception they asked to be included. In fulfilment of this obligation, I presented a talk to UNSW on 13 April 2007, which was well attended. I have placed the overheads and recording into ANU's institutional repository Demetrius[xxxix]. I also sent an email on 18 October 2007 to every participant who asked for feedback with a list of all my publications to date.

Several participants have remained in contact, with some emailing information requests as they have come across the issue in their work environment. Others appear to have taken a proprietary role in my research, sending suggested readings as they have come to hand.

Possible outcomes from study design

It is helpful before embarking on a study to consider the way some of the outcomes may present themselves, and a short summary of my thinking before interviewing is listed here. Stratifying the sample of researchers by dividing the population up into sub-populations means the study is looking at six groups in total. The risk is that the stratification means the number in each strata becomes so small that the results would be statistically insignificant. That said, this is a qualitative study, not a quantitative one and there are several advantages to using a range of disciplines with different publishing emphases.

A convergence of some responses across all groups would mean it would be possible to make an argument that these attitudes or behaviours represent the Australian perspective. If however the responses demonstrate a difference between the two institutions, but a similarity across the disciplines, it could be argued that these represent the attitudes and behaviours of the university in question. Similarly, those responses that differ from discipline to discipline within an institution, but converge across the institutions could represent a disciplinary difference.

If a strong difference manifested in one of the six groups, such as one group showing a high level of understanding and acceptance of open access, the next step would be to find out what makes that group unique amongst the six, and then determine if the differing factor can be applied in some way across the board. It is also possible that all or most respondents show a similarity in their attitudes and behaviours to a level where there is little distinction between the discipline or institution. This would in itself be an interesting finding, offering the tempting possibility of a 'one-size-fits-all' solution to the problems facing Australian uptake of the new publishing systems.

As will be discussed in Chapter 8, only one of these possible scenarios occurred, but it turned out to be a far richer vein than initially anticipated. The next two chapters will discuss these interviews in detail.

Chapter 5 -
Scholarly communication results

Introduction

The following two chapters present the results of the empirical research conducted for this project. The nature of the study, as grounded theory research, means that ideas and themes started emerging from the beginning of the interview process. As discussed in Chapter 4, not every question was asked in every interview, and some questions were answered by the participant during the discussion of another issue. For this reason these results are not structured in the format of a question followed by the various answers. Instead, the information is presented as two chapters encompassing five categories: researching behaviour, publishing behaviour, peer review/editorial responsibilities, managing the academic career, and understanding of open access. The results from the triangulation with QUT are discussed in depth in Chapter 8.

This research is qualitative using grounded theory, which does not lend itself to graphical presentation of results. Instead, examples are given using direct quotes from the participants to demonstrate the point. Where appropriate there is some discussion in the results to help the reader understand the relevance or significance of the quotes given. It is impractical to present every quote relating to every question, so those which most clearly highlight the point are included. With the exception of the questions about the institution's repository there was no discernible difference between the institutions so all the results here are broken down by discipline, but not by institution, unless specifically stated otherwise.

This chapter begins with researching behaviour, then looks at publishing behaviour, finishing with information about peer review responsibilities.

Researching behaviour

The way researchers keep 'on top of the literature' varies widely, with people using many different strategies. Generally speaking, researchers undertake two kinds of searching of the literature, broad and specific (Back, 1962). That said, there are vast differences in the way researchers organise their work groups and their collaborations, the way they search for information, where they publish and how they communicate both formally and informally.

This section of the chapter describes the answers interviewees gave to the following questions:

- *How do you keep up with what is happening in your discipline?*
- *How do you decide if an article is worth reading?*
- *Do you ever hit barriers when collecting information?*
- *Are you satisfied with your current access to the literature?*
- *What changes in the past 10 years have you noticed in the way you search and your ability to find things?*
- *Does a barrier mean you change what you are looking for (finding an article that is easy to get hold of that says essentially the same thing?)*
- *How do you go about obtaining copies of the articles you need?*
- *Have you ever sent out a copy of a pre or post print to colleagues on your own instigation or on request?*

Peer review is discussed later in this chapter, but in this discussion about researching behaviour, it is worth noting that respondents in all three disciplines described peer review as one of their information-seeking techniques:

> Reviewing is interesting. You can keep up with what's going on. (Sociology)
>
> Reviewing is good in it forces you to keep up with what's going on. (Computer Science)
>
> In a way I don't mind refereeing. It forces me to read things I otherwise don't see. (Chemistry)

This chapter describes responses by people in each discipline separately. It begins with their information-seeking, including the electronic tools they use. The importance of informal communication is discussed. Any barriers to the information they need are then explored.

Information-seeking by Chemists

General literature search

Of the three disciplines interviewed, chemists had the most systematic approach to 'keeping on top of the literature'. Some chemists still maintain personal subscriptions to paper journals and the departments also maintain paper subscriptions in the libraries which are used by some of the interviewees. Several chemists interviewed indicated that general browsing of the literature was still part of their routine, although many of them

mentioned how different things are today from ten years ago, when putting aside a period of time each week to sit in the library with the new display of journals was a regular habit:

> In [earlier institution] the scientific library was down the corridor and every Friday afternoon I would go and sit down to look at the changed display of what has come in that week … That browsing technique I can't do it anymore. I still browse *Tetrahedron* because I get it in the mail … Now I try to keep up with a handful of major journals and do it very badly. I get access via the web to journals, I scan the Tables of Contents.

Friday appears to be the day that used to be set aside by several chemists for this activity. Respondents indicated that browsing in this way had the advantage that it allowed the browser to "flick through, then you get things from left field". It would seem this practice is now entirely outmoded in favour of email notification, "I have not picked up a journal in the last three years. I just remember the last bastion of paper. I remember the reading area in the library". The chemists, almost without exception, undertook systematic literature searches. Some have replaced their regular Friday browsing with an online version:

> I get abstracts of journals sent – keeping up with it all is hard. I am on email lists … I look at journals online. When they first came online I used to set half a day a week to look at journals by skimming through the journal abstracts and flicking through the journals. I found that quite rewarding as you can see things you otherwise don't see.

It is evident that the volume of literature is now very large but most of the interviewees strive to keep up with journals in their field:

> There is a series of journals that I read religiously – I look them up online and skim [through] the Tables of Contents. Periodically, once a month, I look at SciFinder or similar search for candidate areas or particular authors – in areas close to what I'm working on.

In some cases this activity is still carried out in the library, often at weekends, "I am tending to go into the library [for a] few hours each week. The library is in the building, it's a very good one. Normally [I go] on weekends". This chemist then prints out any interesting abstracts and reads them at their leisure. Some Chemistry papers have abstracts consisting of graphics of the chemical structure discussed in the paper which provide a comparatively fast way of skimming through the literature. In addition, 'alerts' which are circulated in this discipline also assist in keeping up to date:

> Ten years ago I spent far more time in the library. Now the contents lists are delivered via alerts. 40 contents lists. Saturday morning is a busy one. I read them within a few hours of getting them otherwise the inbox gets out of control. Some journals are more important than others. I guess that there are 10 really important papers per week.

There were, however, a couple of chemists who were more sporadic about their searching, while others used their reviewing as a method of keeping up, "I review about two papers a month … [it's] another way I find out about what's going on. It's running ahead of reading the literature". Some chemists described alternative ways of keeping up with the literature, including one who uses their students as a resource: "I have a group meeting once a week. Students are assigned journals – with a specific list of categories. They pick up relevant literature and discuss at meetings. I don't sit down and trawl".

For those chemists I spoke to who do not undertake this regular literature browse, there appeared to be vestiges of guilt with not doing so:

> I don't keep on top of what's going on in the literature. I mostly use SciFinder these days and look for key words. I don't sit down and read journals, I should … You can't read everything. I doubt many people have enough time to read the literature they would like … I don't get emailed the Tables of Contents. Even then scanning through eight to 10 journals takes a fair amount of time.

Searching for a specific topic

The second type of information search involves specifically searching for work that relates to a research project that is being planned, currently in process or being written up. Chemists use a variety of databases for this purpose, with the American Chemical Society Abstracts, the Web of Science and PubMed all mentioned. The search tool used by almost every chemist interviewed was SciFinder, "[w]e have a very good chemical database called SciFinder run by the US Chemical Society. Often it is easier to find original papers through a search". Another chemist commented that "it has really revolutionised the way we work with the literature".

One chemist said that rather than restricting themselves to an initial SciFinder search, their searches continue throughout a study, "[b]ecause Chemistry is going on everywhere", and they do not want to miss something that might have been published during the time of their study. In addition, as a backup their "students are also doing that. Multiple check, there is more than one person doing it".

While "most of the work is found on Pub Med", a couple of chemists also mentioned the Web of Science because: "it allows me to get away with monitoring only eight out of 100 journals. It connects me with papers I haven't seen. It's a collating mechanism".

Electronic search tools

One chemist commented that, "SciFinder is one of two tools. The other is Google – they are complimentary. Sometimes more modest journals you can find through Google and get free access. It is not foolproof, you still get stymied." Those that admitted they did use Google did so somewhat reluctantly, "I have Googled – generally for clarification about a topic, I am sorry to say". This mistrust of Google was reflected by another chemist, "[o]ccasionally I use Google a little – it is not something I rely on". In summary, chemists are systematic in their search of the literature and have good search tools available to them that they use widely.

Information-seeking by Sociologists

The sociologists interviewed rely on a combination of journal articles and books for their browsing, following citation chains. They described a broad range of information-seeking techniques, such as PubMed Central, Project Muse, the library's own electronic resource portal, and government websites.

The idea of 'keeping up' with the literature was barely evident in the Sociology group, although one person specifically stated they have Tables of Contents regularly sent to them:

> I am on Ingenta and I get about five or six, oh maybe more, seven or eight journals regularly. But I don't usually have time to read through them but it is a good way of keeping up with what is going on. I [also] go into [the university] library, look up the journal in the electronic selection and download it.

Another researcher, who browses through Tables of Contents, tends to link all their reading to teaching. A third follows journals but in a more relaxed way, "I keep in touch with what journals are doing. Every now and again [I] go into the library, look at serials and flick through them". More common was a combination of 'active and passive' searching:

> Actively I have a few references and know what I'm looking for. The passive is when I am looking at another kind of problem and see something that might be

> relevant – serendipitous. I might look at a book – where I know I have seen something before.

One reason for this technique could be the breadth of the discipline:

> I have used whatever references are available that were relevant. The ideas are interdisciplinary, the field is so broad I don't worry about covering it … it is different in the sciences – you always have to cover your tracks and have to know what has been done.

Otherwise there was far less emphasis than the other disciplines on regular engagement with particular journals, with one researcher using "whole transcripts from the Federal Reserve Bank website". Several interviewees described a combination of book and article use with one researcher describing the use of key books, but primarily tending to "read largely articles because I am pursuing new fields, a lot of literature in a short time". One self-confessed 'book person' reads "about three books a week … I buy books out of my own personal budget".

The sociologists seemed to be aware, in a way that was not expressed by the interviewees in the other two disciplines, that the library is providing them with the portal they need to access the material they are looking for through electronic databases that can be accessed from home or work: "There are advantages to being in a university, at the moment there are adequately trained librarians who know which databases they subscribe to. You can belt through [a search] in six weeks".

Of the three groups interviewed, sociologists are the most likely to respond to the 'increased visibility' argument. Interviewees at both institutions described a less-than-optimum access to literature through their libraries, which may explain their awareness. In addition, there can be a protracted lag time in Sociology between manuscript submission and publication. The information-seeking behaviours of the sociologists varied greatly, with more than one ANU sociologist "going to the National Library on weekends", and the UNSW sociologists using a combination of "what is in UNSW or Fisher [University of Sydney] Libraries".

One sociologist described their approach to the literature as "non-systematic searching" which allows the researcher to experience serendipitous discoveries. In these searches, browsing in books or on the internet, what turns up is "largely a matter of accident". Indeed one sociologist specifically said they did not have notifications sent to them,

"because I would be overwhelmed", stating that "sometimes it's an advantage not to know what's going on – there is so much you don't want to go near it".

One researcher writing a dictionary noted the problem of changing definitions of words over time, which poses a problem for internet searches:

> [It] was great fun sitting in the school of medicine library. You find out so much more serendipitously that you don't come across on the web. You don't spot it because of however it is coded or how they have chosen to key words doesn't trigger anything … I spent a lot of time in the library physically pulling things off the shelf. How they had defined or used a word, what context it was in, had it changed over time.

Several sociologists described 'non-systematic searching', often referred to as 'snowballing', which consists of following "footnotes, references in articles, leads given by people I know". One researcher described keeping up with the literature "by the seat of my pants", and said refereeing is another source of new references: "It is the pay off in refereeing. I pay very close attention to the bibliography – how up to date they are. If there is something I haven't seen I check it out".

Electronic search tools

Despite having a higher reliance on books as a source of information than the other two disciplines interviewed, many of the Sociologists interviewed also used search engines, although some expressed frustration at the broad brush Google takes. Even the self confessed 'book person' has undertaken some online searches to "get a sense of how it plays out in the discourse". Another sociologist made the observation that "some material lives only on the internet. Future academic research won't involve literature because of the alternatives. It's what people want. I am using Google or AltaVista or Yahoo".

Another made a related reference to the usefulness of Google as a source of snowballing: "Sometimes if I just do a Google search you can pick up things that have been placed on websites, from a CV. I use this to get a reference when I know part of the details". However, another sociologist observed that one of the problems with this was: "With the Internet it's a nightmare. You put the keyword in topic you get 300,000 hits in Google". While search engines were described as having "varying quality", PubMed was praised by one researcher, and another said the move to electronic availability of articles means "[m]ost of the things I am interested in I can access. It's better now through Project Muse".

At least one sociologist stated they were on a couple of listserves, but a couple of people expressed some discomfort with the electronic tools: "A lot of colleagues keep abreast through the web. I am still a book person … Occasionally I find something from the web – I have bookmarked a few". These responses indicate that this group of sociologists are not adverse to using electronic search engines.

Information-seeking by Computer Scientists

Computer scientists differ from the other disciplines interviewed in several ways. They were chosen as a group because their publication output is predominantly peer-reviewed conference papers with some journal articles.

Systematic searching

Some computer scientists do systematic searches of journals in a similar way to the chemists:

> I read the journals. I have got subscriptions for hard paper copies. Lots come out on the internet. I get Tables of Contents. Usually I have a quick scan, if it is interesting will print it out. Or I take printed versions home and read them in bed. That's general searching.

Two other researchers mentioned having Tables of Contents sent to them, which they scan through. However one researcher said if they find something interesting in the journal they "usually go to the person's homepage – these have more information because the journal is two years behind – I find a journal paper and drafts of more recent work". In the same way one of the chemists mentioned using their students as a resource, at least one computer scientist also relies on "people in the group to be more up to date than me. I have four PhD students and two postdocs. I send them to present at conferences, they come back and discuss other material presented".

Some computer scientists keep personal libraries of articles, both paper and electronic: "I have got a huge compactus of paper copies of stuff which I should probably chuck out. I used to file them all alphabetically by author". There seems to be a trend away from that because of the subsequent difficulty of finding papers later: "nowadays I often chuck the paper copy out when I'm done with it because I would never find it again. That's what it is about, it's about the findability". Others keep electronic copies as well as filing paper copies by authors but said that often it is easier to look something up again online: "I know

there's a paper on that bookshelf over there, it is actually faster to for me to type those words into a computer than it is to walk across the room".

Electronic search tools - Google

Computer scientists, not surprisingly given their propensity for personal webpages, were keen users of general search engines (as opposed to specific databases). In the most homogenous answer to any of the questions asked in this research, almost without exception the computer scientists stated they used Google. In some cases the interviewee described using Google Scholar as well as Google. Universally however, Google was hailed, with comments ranging from: "Google is the solution to everything", to "I tend to use Google – I can't live without it", and "Google is really good – especially in Computer Science, it has changed the way you find things".

Electronic search tools – Google alternatives

Google however, is not the only method of looking for information the computer scientists described in their interviews. Like Chemistry, the main publication outlets are fairly well defined in Computer Science. Each sub-discipline has its own set of conferences that are applicable, and within that set there is a ranking. Many interviewees referred to the proceedings from IEEE (Institute of Electrical and Electronics Engineers) and ACM (Association of Computing Machinery) conferences, which allow users to search for a paper.

Some people mentioned databases on Computer Science websites including DLBP (Database of Logic Programming) and CiteSeer. These can be searched by keywords, but also DLBP has a "public record of people in computing. [It] has great archives, mainly computing stuff, has people classified". CiteSeer appears to have some credibility issues with one person saying "CiteSeer is not up to date". A second interviewee agreed: "CiteSeer is good – if you can find the paper there is guaranteed to be a link to the paper. The problem is it is lagging by six months". Another said: "If it is a paper from CiteSeer I am never too sure about the reliability, [I would] probably try to obtain the original from conference proceedings or from the website of the author".

Generally there is an expectation that all the proceedings from major conferences will be available online: "Design automation conferences put stuff up anyway. They do professional filing of people's keynotes, the paper, and sometimes the powerpoints". One computer scientist said that if they have been able to attend a conference they can "scan through the sessions I am interested in to see if I am interested in any papers".

Informal communication

Broadly, a discipline is 'a particular branch of knowledge'. Most of the interviewees in all three disciplines were working in small academic groups. The intimate nature of these groups means researchers are known to one another. This aspect was mentioned by members of all disciplines interviewed:

> The number of people in my absolute finite area is in the tens in the general area it is in the thousands. I keep an eye on about 20 people and there is 10-15 with a broader interest I keep an eye on. (Chemistry)
>
> It's a very small pool in Australia. There are only 5-6 people at the top. (Sociology)
>
> [I rely on the] word of mouth of colleagues. It works because I know most of the people active in my field, they send me their work. 12-20 people. (Computer Science)

All three disciplines described forms of informal communication. Indeed, in the interviews with the computer scientists and sociologists, personal communication was given as one of the ways information is distributed in their networks.

The computer scientists showed a high level of interaction with one another. Possibly due to the nature of their research, computer scientists displayed the highest level of use of Web 2.0 systems, such as wikis, blogs, Skype, list serves and other informal communication channels over the internet. One explained that while research questions were still discussed face to face, discussion lists have been replaced by forums which were used "[m]ore for infrastructure around it, not the research itself eg: discussion technical equipment". One researcher described a collaboration that was conducted almost exclusively online:

> I am part of a focused group … we meet regularly via video using iChat. And if I am talking to non-Mac people we are using Skype. We use Voice over IP over the phone. I have a strong preference for video … We use Wikis quite a lot in a few ways. It is best to do a wiki set up for a project … they are password protected – just for the research group because they have got a lot of ideas that are not ready to be made public.

Other people mentioned subscribing to the relatively old-fashioned mailing lists, which have allowed at least one group to, "hook up – websites blogs etc. with other disciplines dealing with similar problems". Mail lists were also described as a place where "authors

announce their papers, or are discussing particular technical problems". However they are not perfect, as one person mentioned: "it depends on what's been posted – I don't think the coverage is very good".

Conferences in Computer Science

Due to the emphasis in the field on conferences as a form of disseminating information, computer scientists also tend to communicate in person at conferences and consider this an important part of their information-seeking. One researcher described this as an alternative to reading papers: "I keep up by collaboration, by talking to people. There is strong support by search engines. I don't have to go to the library and read. It is not compensating the need to talk to people".

"Talking to people" was a phrase used by several computer scientists because as one person said, "gossip at conferences is very important for finding out who is working out what". These discussions are "a vital part of the publishing regime". Other informal methods include 'tracking' people:

> I am also aware of what people are doing in a given field. Specific people – I track what they are doing. From time to time I look at their web pages and their publications. I, or my students, email them and find out.

The emphasis on conferences means that in Computer Science, people are meeting up with one another regularly, which means active researchers know the 'key people': "If I want the latest developments I contact an author I know or search on Google – the draft is online. This community puts stuff online. For me email works best – I email them direct and ask for a copy". This sentiment was echoed in another response "[w]ith stuff that is specific to the area – I know the people and the factors". Alternatively researchers keep an eye on what is being presented at conferences by serving on the conference committees, which means that "usually I know what is going on. It is rare to find something out of the blue".

Sociologists and personal networks

Research is a social activity. Certainly 'knowing people' was described by many sociologists interviewed as a way of finding out about their field: "I have insider knowledge, people in my field, by speaking to people through email. Personal relationships are forged". Several sociologists interviewed described a personal network that pointed them to relevant information in their field, "I follow … leads given by people I know". This type of network was described by another researcher as "a social network, I know people".

A culture of sharing?

The question about whether researchers request copies of articles they cannot obtain from the author, and whether they respond to such requests of themselves, can potentially shed some light on the general attitude within the discipline to sharing information.

The culture of sharing in Chemistry

Even chemists, who tend to work with an in-house team, will collaborate with a small number of colleagues elsewhere. While some of the chemists interviewed had contacted authors directly for a paper, a few showed some reluctance to unless they had a prior relationship with them: "I only approach the author if I know them personally. If the paper is coming out I will ask for the proof. I know about it because of discussions or previous papers in that area". One mentioned that this was not necessarily a successful technique: "If there is an email address I might write to the individual. These days asking for a reprint is a waste of time". New technology has changed the frequency and how these requests are made:

> I have requested material – yes, and responded to requests, but they don't happen very often. Since things have been available electronically the requests have dropped dramatically. You used to get postcards requesting you to send reprints, and now you send a version of a pdf.

A couple of people indicated that asking for a paper is uncommon, "I would rarely ask people for their paper", with another chemist saying it would occur, "a couple of times a year if that". An alternative is to ask a colleague at another institution if they have a copy of the paper, although this too was described as a rare occurrence, happening "once or twice".

On the other hand, many of the chemists had been approached for copies of their work: "others have approached me. I normally send them the pdf. Occasionally I have had people ask for a printed version. About once a year". These requests seem to have been met with good humour and compliance: "People have approached me. An article came out in a journal that a lot of unis in Europe don't have access to. I had 25-20 requests. I sent them a pdf". However these requests have become less common "since things have gone online, even from India because they are advanced at computing".

The requests these days appear to come from people from less developed countries, described by interviewees as tending to be "newer members of the European Union or third world countries" which were mentioned by several people. One person discussed

East India and South America. Email requests have replaced mailed postcard requests. The difficulty facing these researchers requesting material is they have "no access to the online or printed journal. I try to indulge them – send them a pdf". It appears that the researchers tend to use the journal's pdf for this purpose, which was mentioned by several people:

> Typically the journal will send you an electronic reprint, which you are allowed to disseminate to people who make requests of you. Often there is a limit of 20 electronic copies that can be sent to people who make requests … we would never get 20 requests.

There appeared to be an attitude with some of the responses that the person requesting was simply trying to research on the cheap, "sometimes with review articles – they are saving money on photocopies". Requests that would require the author to photocopy a paper themselves are not complied with:

> I do respond to requests if I have an electronic copy – I email it to them. Even more rarely people come for a copy of an old paper – I don't know what to do.

The culture of sharing in Sociology

Like the chemists and computer scientists, the sociologists interviewed both request, and receive requests for, papers. It seems this is happening less often as more material is available online. One researcher mentioned relying on a well-resourced colleague who, "has an enormous range of sources. He'd send us stuff". Requesting a copy of work from authors seemed to be unusual in this group, "I rarely might ask someone to send me a copy if they have one". Another person observed: "I have asked if another author could send it, but normally I wouldn't do that". At least one sociologist had found this an ineffective method of obtaining material, "[a]pproaching the author is a waste of time for a paper".

Requests for papers in Sociology also appear to be mostly from less developed countries:

> Yes I have had a lot of requests for that, the overview journal, especially from the then Soviet Union and India. I don't think anyone from Europe, Australia and USA. You get not a lot but perhaps a dozen "Please send a free copy, I can't afford to buy or I can't get access to it". I can't remember, I don't think I did anything to tell you the truth. My memory is I didn't do anything.

Postcards were used for requests 10 years ago, but this has almost completely stopped, "it's a very rare event, contemporarily speaking it wouldn't have happened in the last 10 years", although one researcher said "[I]n the last five years I have received one from

India". Not all requests are complied with, with the consensus appearing to be, "most of the work is out there. If they can't get hold of old material, I have an electronic link I send to other people". Another person said they have a request for one of their books, "about six times a year … They can get hold of stuff – most things are readily accessible on the web or they can buy them". Another mentioned, "when I get a postcard from Sweden asking me to post a copy, I can't see the point".

The general results indicate that despite having to be quite resourceful in their methods of obtaining material, the sociologists who were interviewed seemed disinclined to contact authors direct, and in a couple of examples were reluctant to assist people who were asking them for help.

The culture of sharing in Computer Science

It is part of the social norm of Computer Science for researchers to have their own website which at the very least lists (and usually links to) all of their publications. These websites are often the first port of call for researchers trying to locate a particular paper. In addition, searches conducted by computer scientists are often looking for the author over anything else. Almost without exception people made comments like, "If it's on a webpage I will pull it off that", or: "In Computer Science we can go to the author's website".

Several people indicated that the webpage was the first place they looked for material because there is a problem when keywords change their meaning within the discipline:

> [Author searches] seem more stable than keywords and subjects because those are bound to fashion trends … First you look for personal websites. If they are half reasonable at handling their network presence, you should get enough hints and starting points to find [the work].

This method has advantages: "I look up a particular person to see what they are up to. Looking from the people's point of view is better that looking at individual articles". Somewhat surprisingly, given the availability of papers online, a few computer scientists mentioned contacting the author:

> If a paper is not in the library system, I will go through and email to people if I think they have it. I will also search Google. For a last resort I send a request to author - most are responsive. They will send the paper and the raw data … This is very much a way to increase the impact of a paper. It is indirectly related to impact factor. In order for people to cite a paper they have to read it first.

Some computer scientists emailed authors for papers as a matter of course, "I contact authors – regularly". One said "[w]hen I started in 2000-2001 – I had to email the author to get copy of papers – I always did it", which would indicate that things have changed. However, other people indicated it was a rare event, "in one case [a paper I couldn't find was] written by someone new. I sent them an email and got a copy". Another computer scientist said: "It doesn't happen very often. Only on rare occasions I have to write to the author and ask them to send by snail mail. I email to ask for an electronic copy".

This technique is not always successful, because "a lot of people ignore you". Another person described "a bad experience. I emailed the author and got nothing back". Another researcher who had had the same experience gives up if they "can't find a paper … I used to send the author an email, often there is no response". Some computer scientists don't bother asking the author for old papers: "I have not contacted the author for a copy. I ask the library to do it. The author would have to make a copy and pay for postage".

In return, it is rare for a computer scientist to be asked for their material, partly because they generally make their work available. Requests tend to have been "in the past, not recently, more in the era when things were not available electronically". Another person explained that "sometimes people ask for copies of things. Not everything is available on my site. I do send them – I put it in an envelope and send it off".

In addition to putting things on websites, at least one computer scientist described "sending things out when I am submitting them to promote my work a little bit. I have got all my publications on my web page including pdf's with links to publications in journals".

Access or barriers to the literature

Barriers for chemists

The intention behind the question about barriers to the literature was to ask whether the academic has experienced an inability to obtain a paper because of a subscription barrier – for example, if the university library did not subscribe to the journal they were looking for. This was not how the some of the chemists interviewed interpreted the question. Possibly because the two universities that were targeted in this research are well funded (by Australian standards) and because Chemistry in particular has a specific and defined set of journals, it appears that there are no real barriers to the literature for the chemists interviewed. Only a couple of people mentioned barriers. One was language: "there is a bit of stuff in the Chinese literature that I find is hard to get hold of. A bit in Russian literature,

but it is pretty rare these days not to have access by one means or another". Another barrier was the inability to remember details about the paper to look it up correctly, as one described, "a barrier would be probably remembering who wrote a paper". As with Computer Science, a major barrier was older papers, "I never hit a barrier [when looking for the literature]. The only exception would be something that is old or not online, such as a 1904 paper".

That said, it doesn't mean their university subscribes to everything they need, "I can have problems getting hold of papers … In *Synthesis* you have to subscribe in a funny way. Patents are very difficult to get. You can at least get the reference". The chemists interviewed simply found ways around obtaining copies of hard-to-find articles. For example:

> Some societies have scanned older issues in right back 120 years. Now we have online access to US but not British material which has access only since 1996. A lot of paper copies have been put into storage and you can get them out by going to the library and requesting it but it's a hassle. Often people work their way around it.

Even if the library does subscribe, one person commented the level of access is not always sufficient:

> There is a problem locally with SciFinder – the University only has two seats. Mid-morning/afternoon demand is quite high. So if you timetable it right it is OK. For a large institute this is a bit difficult. They keep stats on usage.

Several chemists mentioned using personal networks to get hold of material: "I have a friend at another university". Two other people mentioned this technique: "If I can't get a paper – that will happen once or twice a year. If I do need it I will contact a friend at another university or interlibrary loan, it takes a couple of months", and "I have contacted a person at another university and they get a copy. This is not a solution for everybody".

Another solution is to have personal subscriptions to paper copies of journals, but this is becoming less common, as one person explained:

> For years I subscribed personally to major journals so I would do it [browsing] at home. In recent years I have given it up because I have spent lots of money. In the move [to the new Chemistry building] I have thrown away vast numbers of journals.

Some chemists use the library in person, "I can find a hard copy in the Library if I can't access without a password, The Library is shrinking but it is still pretty good". There is support for interlibrary loans because "[t]he way libraries cut their subscriptions they talk to each other so someone's got everything". Alternatively, "we can order and have them faxed though or sometimes you can't get hold of them and you work around it". Again students are used for this type of legwork, "if ever I wanted a review desperately – I use interlibrary loan. If I'm presented with a barrier I send a student to do it".

The chemists interviewed also use the 'close enough' method, although apparently not as extensively as the computer scientists, "if the library doesn't subscribe – I give up and go to an alternative paper" with another researcher saying: "if I can't find a paper easily I would first try to find a similar paper".

Barriers for sociologists

Some sociologists expressed satisfaction at their access: "[My institution] library subscription list is comprehensive, I have not used interlibrary loan since being at [institution]". Another described having "no problems with the access to the literature, no problems with the cost. I enjoy the hunt – being able to track down obscure articles". There appeared to be contentment with the access to the literature with one researcher saying: "I haven't [experienced a barrier] often enough to cause concern. Lets put it another way. I haven't put in an interlibrary loan in for an article for about five years".

One difficulty mentioned was that of inaccurate indexing:

> I have problems when there are misprints in the title of the article or a spelling mistake in author name I am searching for it and can't find it. It can take three or four evenings to work out what is going on. Is the article worth the chase?

The 'close enough' technique of finding a paper that is similar to the one that appears to be unobtainable, described by other disciplines, is used in Sociology as well. As one person stated: "In practice 20-30% of articles on a topic are similar to source articles". Often the article is not available, "the article I want is not there one out of five times. If it is not there I usually forget about it – there will be something else". Others echoed this sentiment:

> I have encountered problems on the internet following something up … I have always been able to find alternative sources of information on the web – billions of references are on the web.

A variation on the 'close enough' technique is to give up, "If I can't get something I let go". Another person mentioned that not being able to find something is uncommon, "If I can't find it I abandon it. It doesn't happen much in my field".

Of the three disciplines, the sociologists used the most creative ways of obtaining articles they didn't have access to. Like the other disciplines, they used colleagues who have access elsewhere, "my partner works at ADFA[9] so [they] can get stuff. Occasionally I use the National Library". This technique of using alternative institutions was not uncommon for the ANU sociologists who have major institutions nearby, with the National Library and Canberra Hospital mentioned by several people:

> If I have the full reference I use the library electronic resource and see if there is an online copy. If we don't have it, I will this afternoon for example stop at the Canberra Hospital on my way home and get a photocopy. I know it's there because I donated a set of journals to them.

This last person went to the greatest lengths of anyone interviewed to obtain material. This researcher works overseas at another university, so stockpiles references to look up while overseas, "[i]t is pretty rare when I need something really urgently where it couldn't wait until the next trip. I travel across twice a year for about a month at a time".

One of the few institutional differences that emerged was in relation to feelings about the library. Several sociologists at UNSW expressed disillusionment with the UNSW library, because they had been discarding material and, "if you get rid of books, you get very concentrated knowledge in elite institutions". One person expressed concern that: "the clean out is undocumented, [decisions are] purely on a basis that it hadn't been used. If a book is not taken out for a period will be removed to [purgatory] on the way to hell". In addition, a point of contention was that the "University of New South Wales is heavily oriented to the sciences and technologies". The problems for one person extended beyond the collection held in the library, to the services the library offered, "[i]nterlibrary loan I have used in the past but not any more. It was lengthy the last time I tried to use it".

Sociologists often source their own materials, subscribing to journals themselves. They also buy books because, as one said, "I am willing to spend the money for things to move along", and another said "[t]he library ran out of money half way into the year. I buy books important to my writing, particularly ones that are not in English". One sociologist said "I

[9] Australian Defence Force Academy

am buying books out of my own personal budget. If I have my own research account I can use that. I spend more money on books than anything else".

One interviewee mentioned that they were given about one third of their books by publishers. In all the interviews, only one other person, who was also a sociologist at the same university, mentioned this: "It is routine – all academic publishers come around regularly and work out your areas of teaching – if you are interested they give you a complementary copy. I'm given a couple a year". These two interviewees seemed to think this practice is widespread:

> Publishers have a research team whose job it is to know who is teaching. Every week I have a publisher email offering me a book. They are going to every single academic. Some two times a year, some once a year. I'm on their list. Sometimes they are interested in you writing books, mostly they are selling. They leave them and ask to fill out a form what we think would consider using as text.

I did not ask specifically about this practice. I cannot say if it is widespread or not, even amongst my own group of interviewees.

Barriers for computer scientists

The 'barriers' to the literature experienced by the computer scientists tended to be related to the age of the paper. In general they stated that it was rare not to be able to obtain a paper. When there was a problem it was because the paper predated electronic copies, for example: "If I can't get stuff it tends to be older, pre 1994 – 1995". Another person commented: "It is rarely I can't get hold of something. It is usually if it is something older". The papers computer scientists have trouble obtaining represent a very small proportion of the papers they use:

> Have I been stuck? With older papers from 80's or 90's that sometimes happens in Computer Science, but very rarely, One or two papers I haven't got hold of, out of several hundred.

This problem of older papers is not common because Computer Science as a field tends to move very quickly and older papers are not used much: "We don't use papers more than 10-20 years old". Even then, there are ways around obtaining the information: "With very old things – even these are scanned in and made available", according to one interviewee. Other services are being provided to the community: "There are even complete publications from famous people in the 40's 50's and 60's, even for those you don't have to stretch out too much".

It is rare for the computer scientists interviewed to physically go to the library, although a couple did: “I almost don’t go to library, maybe once a month”. Another researcher said, “I go to the library or ask a colleague for a copy. It happens one or two times a year”. One described it thus:

> If I haven’t been able to get the paper – maybe if it is an old paper or there is no electronic copy – I can go to the library … I check the catalogue electronically – check they have issue there. Then I will go and get it physically (from the library) or make an order from [the library].

Otherwise, the computer scientists described using the physical library rarely, even using students to do their interlibrary loans. One said: “In the odd case, I send a student to the University of Sydney library – they get the book from somewhere and photocopy [it]”. One difficulty with using the library is time:

> If [a paper] is not electronically available or in an easily accessible place then to get hold of it would mean doing an inter-library loan – it takes time to walk across campus. … It is a long time since I’ve used interlibrary loan. It is not often I use the library – my use of the library has gone gradually down over the years, I used to use it physically a lot. … These days I make little use of it, I am mostly getting things off the web.

There is however awareness of the electronic library services amongst the computer scientists interviewed:

> … a student … ended up asking the library if they had [an obscure paper] and before he knew it he had a package on his desk The [library] had ordered the book in, it cost US$200 or something expensive for this little book of proceedings. The library got it, he had it sitting on his desk.

Another researcher described the library acquisition as being: “pretty good. If I get the reference the library can get hold of it … I use the library quite a lot because material is often not available. Interlibrary loan is quite efficient, [but] it costs money”. Even when overseas, researchers “channel through to the [Australian institution] and read things that way and that is extremely helpful because if the libraries all burn down but they still have that access we could still do much of our work”.

Only one computer science interviewee mentioned having personal subscriptions: "I used to have personal subscription to four or five main journals in area, now I have two that I maintain. I claim them off tax, it's not very expensive".

The general attitude appears to be that if a certain paper is unobtainable, then there will be another that is 'close enough'. Several people mentioned that the first step is to go to the author's website to see if there is a version of the paper there:

> I look at the proposed schedule for conference – if I find something that sounds interesting – I Google it and will find a similar paper. The same names pop up. I might go to their website with a draft there.

Even if there is not a draft of the same paper, the author's website is likely to have something similar discussing the same work. As one person described, "If can't get one publication, the author's website will have related papers". Even if the paper itself is not available, there will be other papers which have the relevant information: "If I can't get hold of an original paper - if subsequent work restates something, I will use that". This concept of using something that is 'close enough' was mentioned by several people: "A couple of times I have not been able to get hold of something. I have derived results from second hand material". Another person stated: "Many people put preliminary or current submissions on their website. I may not find the exact articles or the Technical Report it is based on - but I get an idea if I want to chase it".

Alternatively the researcher will simply decide that paper is not necessary: "There are some journals the [library] doesn't subscribe to, I just ignore them". This seems to be judged on a case by case basis: "The other time [I couldn't get hold of a paper] I went to the catalogue – they didn't have it. [I asked myself] is it that important? I decided it probably wasn't". In answer to the question about barriers to the literature, one person mentioned that the publishers were not maintaining old material properly, "[o]lder papers – [supplementary] material has disappeared".

Summary of researcher behaviour findings

Information seeking

The chemists interviewed continue to 'keep up with the literature' with many describing how they undertake a broad look at the literature on a regular basis. Some of them still maintain personal subscriptions to paper journals and the department libraries also maintain paper subscriptions which are used by some of the interviewees. General

browsing of the literature through email notification was still part of the routine of several chemists interviewed. However many of them mentioned how different things are today from ten years ago, when putting aside a period of time each week to sit in the library with the new display of journals was a regular habit.

The sociologists in the sample rely on a combination of journal articles and books for their information. There appears to be considerably less emphasis on the general browsing for background information, possibly because a concept of 'the literature' is far broader in this discipline than Chemistry, which is fairly well-defined. Sociologists also relied more than the other two groups on 'serendipitous' research, such as following citation leads and working through bibliographies.

In Computer Science, it is common practice for an academic to have a personal website with all their published papers listed on that site. In many cases there is a version of the paper attached to that listing. Without exception, the computer scientists spoken to used Google as a search tool. Computer scientists expect to be able to find things freely on the Internet and very rarely use the library, and almost never use interlibrary loan. They will put material on their own website even if it already appears somewhere else as an open access copy. These websites are often the first port of call for researchers trying to locate a particular paper. In addition, when conducting searches, computer scientists are often looking for the author over anything else. Google however, is not the only method of searching for information, many interviewees referred to the proceedings from conferences which allow users to search for a paper. Some people mentioned databases on Computer Science websites. Generally there is an expectation that all the proceedings from major conferences will be available online.

Informal communication

The Chemistry interviewees described the number of people in their finite area as being 'in the tens'. Very few of the chemists had requested a paper from an author, but many of them had been approached by people from less developed countries. Sociology is also a field where people tend to know each other. One person described it as a 'small pool' with only five or six people at the top in Australia. Like Chemistry, it is a field where being able to network well can be advantageous to a career. The sociologists interviewed tended to work alone or with one other person. This may explain why, despite having to be quite resourceful in their methods of obtaining material, the sociologists who were interviewed seemed disinclined to contact authors directly, and disinclined to assist people who were asking them for help. Some of the Computer Science interviewees also described research

networks of only one or two people. Having close relationships with these people is a valid form of information-seeking within this group. Computer scientists, possibly due to the nature of their work, were the most likely of the three disciplines interviewed to embrace Web 2.0 tools such as wikis, blogs, discussion lists and Skype.

Access to the literature

The researchers in the universities studied have good access to the literature they need. None described a barrier to the literature, demonstrating various techniques to obtain any literature their library does not have. These include interlibrary loans, using alternative institutions and a culture of sharing within their communities. One benefit of having a glut of information published is there always appears to be another paper which is 'close enough'.

The chemists expressed very few barriers to the literature. Some use personal networks to obtain materials, others hold personal subscriptions, and others try finding a similar paper to one they cannot locate. The sociologists also described using the 'close' enough' method or giving up when faced with a barrier. They described using the libraries of other institutions, sourcing their own material, subscribing to journals or buying books. The computer scientists expressed few barriers to the literature with the exception of the rare occasions they needed an older (pre 1995) paper. Overall the respondents expressed satisfaction with their access to the literature.

Publishing behaviour

This section details responses to the questions asked about publishing behaviours. These questions address some of the fundamental tenets of the open access concept. The questions were asked to ascertain what choices researchers are making when they prepare material for publication and decide where to send it. Questions were also asked about how successful they were at having their papers accepted. The other two aspects of publishing behaviour were explored – the interviewees' understanding of copyright laws, and how they felt about them; and if they produced grey literature in the course of their work, what they did with it.

Many of these issues have been presented in the open access debate as problems with the scholarly publishing system. The interviews attempted to establish if they are being felt on the 'front line' by researchers.

The section begins with a general overview of the three disciplines' publishing trends, before looking at why people publish, their rejection rates, problems such as delays in publishing, and having to reformat to resubmit the same work to a different publisher. In this section the responses to the following questions are described:

- *Why do you publish your work?*
- *Could you explain your choice of the journals you have published in?*
- *Have you ever been approached by a journal to publish your work?*
- *On average, how often are you accepted by the first journal to which you submit?*
- *Have you ever submitted to more than two journals (and if so what was the overall time to publication?)*
- *On average, what has been the period of time between submission and publication – do you have an opinion on that?*
- *Have you ever published in an open access journal?*

Why do researchers publish?'

Generally there were two reasons interviewees gave to this question: 'Why do you publish?' One set of answers was about communication, the other was about reward, often from the same person. To maintain the integrity of the thematic split of these results, I have detailed the answers that discussed reward in the section on Managing the Academic Career. Those answers that discussed communication are explored below.

Why do chemists publish?

The chemists said they mainly publish to encourage a dialogue with their peers, after all: "If you have done the work you get it out there". As one person put it: "[t]here is no reason for doing what we do unless we communicate. It validates what we do because people see it". Publishing is also: "the major route of scientific communication bar conferences. We are certainly keen to have our work known to the community".

Chemists also mentioned that publication is something that is expected of people who are working as researchers, "[I]t is part of the job. I enjoy it. I do research then get it [the paper] out. It is what academia is about", because as another put it, "It is what I am paid for … Knowledge is not a game we play for our own enjoyment. If it is not out it doesn't exist". Generally the feeling appears to be, "I am not pulling my weight and accomplished if I am not published".

The idea of ego was also raised amongst the chemists, with one saying they publish, "… not for selfless reasons, I want to get stuff out there and get noticed. If there was no

recognition (from peers) I'd still do it". Another described the reason they publish as: "Approbation. I want to share this work … Having completed a project – culminate in to record in literature for prosperity – I am proud of it. It is like producing a piece of art people might enjoy".

The issue of 'repayment' also emerged through the chemist's answers, because the taxpayer, "pays my salary, and my research grants. It is absolutely imperative that you publish to give back what they pay". As another respondent put it, "you are using taxpayer's dollars to support your research. We are obliged to publish what we do", and a third mentioned, "[w]e have got an obligation and have received money for research so we must publish work". One chemist described the need to produce publications to justify receiving public funding, saying it is very important, "[g]overnment gives you money to do what you want. The only outcome is publication. Why would they give it to those who haven't published? Publications put you in the game".

While many chemists mentioned that publishing to further their career is secondary, a clear example came from one person who indicated that even 'poor' results should be published for the community's benefit:

> To only really publish top stuff is wrong because in synthetic organic chemistry we are making new compounds. There are some journals such as *ARKIVOK* – it takes publications of new compounds. People use it to put up new compounds. I might think it's a crummy paper but someone else might read it. They might see something that I don't see. We must publish even mundane stuff.

Another stated motivation for publishing was as a work management tool, "The process of publication is very helpful in getting things done". Another chemist agreed, stating "[y]ou can't beat the rigour of writing a paper and submitting it for peer review".

Why do sociologists publish?

The sociologists interviewed appeared to regard the publishing imperative to be less important compared to the interviewees from the other disciplines. Career was certainly recognised by the sociologists as a factor in the need to publish, "[I]nitially in your career publishing is important. I have a high publication rate. I have gone for promotion a few times. I went speedily to senior lecturer but I am now stuck".

However, more importantly, publishing seemed to be to help consolidate ideas, "I can't figure it until I write about it", and to further the field, "[t]he key to why you publish is the

socialisation factor, to contribute to the advancement of knowledge". Not everyone felt that this goal was being achieved however, "[a]cademic life is not intellectual. I want to engage, have a sense of energy. There is very little of that".

The word ego came up again in the conversations with sociologists about publishing, "[I]f you are honest there is a big ego factor involved … in any profession you get ego/personal satisfaction from doing well and the comparators are people who publish a lot". However, ego does not always mean a 'big head':

> [whistles] God knows [why I publish]. To answer the perennial question of "Am I good enough?". What drives academics has got to do with a profound and deep insecurity somewhere along the line because you wouldn't do this for the money and you wouldn't do it for the fun. It's the personal demon that drives you.

A couple of people in Sociology specifically stated that they did not take much notice of the career aspects of publishing, either ignoring them. For example one stated, "I don't see the need to follow the DEST[10] guidelines", or tolerating them with frustration as another expressed:

> It is getting totally out of hand, producing papers and books … People don't read anymore. Grants are about getting another totally useless publication out. I have lost the desire to be associated with that sort of process.

One particularly time-poor sociology interviewee uses writing a paper as a justification to his/her partner to negotiate time away from the children to write:

> I really enjoy writing – it gives me a focus I wouldn't otherwise have. It means my time needs are visible – I can say to my partner I need how many hours – if there wasn't a paper then I would be put off.

In one instance the interviewee mentioned the text books they had written, which serve the student population rather than the wider academic community. They began writing because they were "teaching and frustrated with other's books. I have a belief I can write clearly and in a manner more balanced than other text books".

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[10] The Department of Science Education and Training, the name of the Australian Government department to which researchers previously reported their publications.

Overall in the interviews with the computer scientists and chemists, the idea of the impact of their work outside the academic community did not come up much. However, a couple of the sociologists mentioned this: "I want to influence companies to operate more safely – mainly via the books". Another sociologist also publishes books for the non-academic market: "I have [a publication] planned – it is of no value to anyone except Easter Islanders. There will be discussion about documentation on their island. They haven't seen it. I do publications in Spanish and English".

Why do computer scientists publish?

Overwhelmingly, aside from the issues of needing to publish for career reasons, (which were often stated as being a secondary reason for publishing), the computer scientists said they publish to communicate with their peers. The intended 'audience' for their papers is colleagues, rather than promotions committees. Many of the interviewees were very animated when answering this question. For example: "I get a lot of satisfaction out of seeing work being exposed and accepted and taken up … research publication is one of the primary ways we do that in our field".

Another also described the satisfaction of being published:

> I think it's quite a complex thing. At some level you have to publish or I will lose my job but I don't think that's something that causes me to do it. It's part of being a real researcher when you get a result that's how you want to tell people. You feel excited about it. You know if you tell people they are interested. You get kudos and people will be pleased with you. All these factors as well. I think – it sounds kind of corny but there's a satisfaction factor. You have knowingly taken part in pushing things farther – that's why you do the job. It is something you didn't expect or just a proof to work out. You have advanced things a bit. There is great satisfaction about that. It certainly feels very satisfying. I am not talking about the Dean – people who are actually going to read this stuff.

Others described publishing "to get feedback from the community", or "to get ideas out there and used or evaluated". These responses were describing the academic discourse that results from publication, "I am not concerned about the impact factor, I am more concerned about the audience of these papers". This relationship with the audience was expressed by another researcher thus: "Really the feedback – you want to see the reaction to your ideas. When you are really passionate about some area, all you are really looking for is some interaction. You can discuss with others what you have done".

A couple of interviewees mentioned ego, “it is a little bit of ego – you want others to hear, your scientific community”. Indeed, the idea of publishing to gain personal satisfaction came through as a common theme: “You want to tell others what you have done because you think it’s great. It is self promoting a bit, it is the way the process works”. Another said: “Part of it is egotistical, I want to be at the forefront. The pure joy that someone is interested in what I am doing. The ultimate is the significance of being picked up by others”.

Publication for promotion purposes was mentioned but not given a high priority: “Somewhere down there is the motivation if you want a promotion here you need to be seen to be publishing – that is low for me”. It appears that recognition within the community is a much more important factor: “To tell people what we have found out. There is no monetary reward. There’s no benefit. But it attracts the reward of status in community”. The community also recognises measurements used by promotions committees:

> I prefer to publish a small number of highly respected papers. [There are] six or seven papers of my 18 that I’m really proud of. I have 100 citations from those papers. That gives me a lot of pride. Only 20% of papers ever get referenced by someone else.

One researcher described the prestige associated with being accepted into a conference: “One thing is about prestige. Sometimes the project chair of conference will tell you how many papers were accepted and how many sent in. It indicates your paper is in top X”.

Another response was related to the uptake of the interviewee’s work in their academic community, “There is no other way [to] enter discussion in meaningful way. It is one of the most intrinsic parts of academic life”. Another indicated that this discussion was central to their work:

> I guess there are several reasons, one is you have done some work and you want to tell everyone about it so it’s ‘look what I’ve done’. There is the criticism and growth of knowledge argument, you get your stuff out there and people can criticise it. There is the making broader impact, there is the algorithm for solving a problem that we think has wider applicability, if we publish it lots of people may use it and do useful things.

In addition there is generally an expectation to publish, to ‘write it down’ because as one researcher put it, “there is no point in doing anything if others don’t know about it”. Another researcher noted that, “if you don’t communicate with your community you are

not advancing or enhancing science in your area. And it is not benefiting taxpayers or society". Several people mentioned the concept of publishing as a way of repaying the debt to the public who are funding them, "[w]e enjoy the privileges of academic life and our salaries. We pay happily in that we report back to the general public. It is underlying the work".

While there was a general sense of needing to communicate via publication as 'payment' to the taxpayer, only one person mentioned the need to communicate with the general public directly, and that this was more widespread, "than 10 years ago when it used to be 'exotic' to talk to the press". This researcher mentioned that outside of conferences and workshops, s/he talked to "press, participate in trade fairs, talk to local computer science workshops. It is all part of the communication process".

Rejection rates

As discussed in Chapter 2, many high impact journals have very high rejection rates. This would imply that a considerable amount of time is wasted in both the preparation and reviewing of papers submitted to these journals. However, this does not seem to be the case within the group of people interviewed. At both institutions, across all disciplines, the interviewees seem to be 'pitching' their work fairly well, and experiencing respectable acceptance rates.

The rejection rates of chemists

In contradiction to the very high rejection rates of some journals, most of the Chemistry interviewees had very low rejection rates. Chemists are comparatively enthusiastic authors, so having 'three or four' rejections is a very small proportion. Figures ranging from a 2-3% rejection rate to 5% and 10% were commonly mentioned. This was usually put down to good selection of journals by the chemists but: "I am pretty disappointed if something gets rejected. Anyone would be but I'm trying to make a balanced decision between the ranking of journal and the likelihood of acceptance".

For other chemists, their rejection rate was almost negligible, with one respondent having "had one rejection in the last 30 years", and another having "never had something not published". These were not isolated responses. It would seem that rejection from the first choice journal is rarely a barrier to being published for these chemists, "I submitted to one journal and was rejected, then resubmitted to a higher one which then accepted it!"

Those chemists who described rejections indicated that the reason for rejection is rarely the science, rather a miscalculation of which journal to send it to. Either the journal was inappropriate, "one was culled by editorial board and not sent out, not because of the quality but because the journal was general interest", or because as one chemist explained they were not "aiming high enough. Recently I have been sending small papers to top journals. One paper was rejected – then the next one, still, it's out in the world within a year. I find it incredibly depressing and a lot of hassle".

Rejection rates of sociologists

Assessing the rejection rates in Sociology is more complex than the other two disciplines explored in this thesis. Many of the sociologists interviewed were book authors, and the process of having a book published is long and complex. Several people described a process simply to have the concept of the book accepted by a publisher that involved several publishers, many iterations and a period of several years. Even completed books take years to be published as one sociologist explained:

> When you send a book to a publisher they can sit on it for six to seven months before they decide to referee it. Then it can take another six months and there is the clean up afterwards and doing the index. The whole process can take three or four years.

Books differ from journal articles as a publication medium in this discussion because the copyright assignment is different, and because the author is paid in the form of royalties. While this may not be a great amount of money, it represents a considerable shift from the position of publishers over the publishing of journal and conference proceedings.

When asked about rejection rates (which was not asked of every Sociology interviewee in this category, because in some cases it was not appropriate), some sociologists responded with surprisingly high rejection rates compared to the other two disciplines, "[m]y work is difficult stuff – my rejection rate is 80-90% I have to try very hard. Sometimes it takes several goes". Not everyone interviewed, however, has a high rejection rate, "I got rejected a few months ago. I was devastated [laughs] [My hit rate] is pretty high".

For these sociologists, it is common practice to revise rejected papers, "[t]wo thirds of the time I get accepted by the initial journal possibly after revision". An alternative is re-sending the paper to a different journal explained another interviewee, "[y]ou have to be pragmatic if work in top journals gets rejected – you send it to the next journal. Some people are more willing to put ego on the line and suffer the consequences".

A couple of sociologists mentioned issues with formatting. For example some journals are very specific, "[t]he format follows the number of words or the number of characters including spaces, visual items must be exact to specific". Others described journals rejecting papers on the basis of formatting, which means for some sociologists, "[y]ou never decide where you are going to send a paper after it is finished because most publishers want you to do typesetting".

This moves the discussion into the next area, which is the challenges different disciplines experience in the publication process.

The rejection rates of computer scientists

The computer scientists seemed to have fairly high acceptance rates, with a majority having about two thirds of their submitted papers accepted. One person said not surprisingly, "it tends to be good research that will just go in first time". Various interviewees described an acceptance rate of about 'two-thirds', 60-75% and 50-70%.

While one computer scientist was accepted to all the conferences they had sent papers to in 2006, this was uncommon. Another said of the 13 or so papers they had written, they had had "a couple of rejections so far". Rejected papers are reworked according to the reviewer's comments and re-submitted, either to the same conference the following year, or, particularly if a student's career is involved, to a lesser tier conference.

Some computer scientists described a higher level of success, with one having a "100% hit rate". Another acknowledged the experience of their colleagues in learning how to pitch their papers to the correct conference. The success often depends on their strategy in choosing which conferences to send papers to as one explained, "[F]rom experience I know what tier to aim for – if it is not earth shattering I pick one in second tier. I usually manage to pick the tier correctly". Often there was a strategy involved in this process as another detailed:

> By and large if you write a paper for the community you have a fair knowledge if this is acceptable for publication. A good number will be published if you angle the paper properly and target. You can submit things to conferences where acceptance rate is 15% … Only ever one paper that got rejected.

Interviewees mentioned that being rejected was not because of second-rate science, rather it was often because they had pitched the paper to the wrong conference: "last year

[I was rejected] because my research is not in core of the conference". Another reason was because the write-up was less than perfect: "[l]ast year I had a couple rejected because they were badly written. I had a Polish co-author and there was not enough time to polish his work". One person mentioned the difficulty of having unusual ideas accepted, "If it is a bit oddball have to submit it three or four times … Some of it is tweaking the existing approach, whereas other times this is a totally new way of doing things".

Only one person mentioned the distinction between being accepted for a journal and being accepted for a conference:

> My journal papers virtually never get rejected. Conferences are more of a lottery, the way they work. Full papers get reviewed. There's a season when this happens, people get overloaded so they are not as careful. There is no chance of getting a right of reply. It is very tough to get into a conference – harder than getting into a journal.

Summary of publishing behaviour findings

The researchers in all three disciplines interviewed in this research generally did not express a great deal of concern about the publishing or researching aspects of remaining engaged with the literature. It appears that they are managing the scholarly publication system, as it stands, well. They are able to pitch their work to the appropriate outlets. Many people indicated that writing publications is a valuable part of their research process, and it helps their work and their thinking. Publication is also a way of fulfilling the academic's obligation to the taxpayer who ultimately pays their salaries. While many people indicated their choice of conferences or journals is because of the impact factors of the publication, this has advantages to them other than simply ticking boxes for their career, as high impact journals are also likely to be read by their peers. Issues such as the cost of journals were simply not a factor for most interviewees.

The chemists reported having less than 10% of their papers rejected. The sociologists tended to have higher rejection rates and commonly revised papers before publication. The computer scientists described having around two thirds of their papers accepted.

Other issues in scholarly publishing

Publication turnaround in Chemistry

Chemistry appears to have relatively fast publication times for its journals, and one explained part of the reason for a recent decrease in the time to publication is automation of the submission process:

> The time taken to print is four months or six months. Acceptance is now six to eight weeks or four weeks. It used to take longer, I remember it taking longer. You email your submission online. We used to post it off, that has made a big difference.

Overall, researchers submitting to a Chemistry journal will know whether their paper has been accepted or not relatively quickly, within two or three months, which is faster than the previous timeframe of six or seven months. One even said, "sometimes these days you can hear back in three weeks". Another researcher described a range of timeframes depending on the journal, "the shortest about a month, the longest three to four months".

A couple of people described very quick turnarounds for Chemistry papers, with several mentioning the referees being the hold-up, "[p]roviding you don't strike referees leaving town you can possibly learn that it is accepted three weeks to a month after submission". Journals are "increasingly online, that's very quick". One researcher said "the world record was eight days between submission and publication on the web". More generally, this researcher said, "it is two weeks before you get a reply from the editor" and "anything taking longer than six months is too slow". Another researcher agreed, "if you hadn't heard by three and a half months you ask what's going on".

These very fast turnarounds in Chemistry were not uncommon with another saying, "one paper that I submitted, it was accepted in one day, published in one week. A lot of it is highly automated these days". The reason for this speed, according to this researcher was "Chemistry publishing is such a competitive field. Journals dine out on how fast they can get papers published. Six months might be the outside boundary. 16-24 weeks is a typical timeframe".

The formatting issue in Chemistry

This issue of the journals requiring the authors to do the formatting was raised by several chemists: "the author does all the writing, the proofing and the typesetting. Now they [the publishers] do nothing". Interviewees described a range of requirements from the relatively benign "need to tweak [papers] for reference concerns" to the reformatting of a paper because it has been rejected and is now being resubmitted to another journal, which one respondent described as, "double handling, it is an inefficient waste of time". Overall the requirements by publishers for papers in final form seem to be onerous, with one described it as "you have to write very succinctly. There are definite limits on the size of the paper – if you print a figure it costs XX lines of text". Another chemist said:

> The workload in submitting paper has increased. You used to write, print and send, now you do far more editing. You put it in the template, prepare the figure (high quality) file format at x dpi. Each person does their own.

In a couple of cases the problems with these format requirements influenced where researchers choose to send their papers, for example one person said they "stick to *Tetrahedron* because I have finally learned how to use the template". Another chemist said, "you get used to the layout. In each tier you try one or two journals rather than try to cover the whole. Employ pragmatism so you don't get bound up with their layout".

Publication turnaround in Sociology

A couple of the sociologists described instances where personalities had caused problems in the publication process, for example:

> The problem with publication is it is an absolute rear view mirror of stuff done years ago. [I am about to have a piece published in a] top place for essays to appear. I wrote it nine years ago. I had a fallout with a person who blocked it … You are dealing with charlatans who are trying to sell something.

These difficulties aside (this was a particular incident, and not representative of the normal situation), the delay between submission and publication appears to be approximately 12 to 18 months. As one interviewee put it: "there is usually about a year delay before publication. Journals are reliant on voluntary labour for refereeing". While they may understand the reasons for the delays, this does not mean that sociologists are happy with the situation, with one describing an 18 month delay as "hopeless". One sociologist explained the "spectacularly long lead times" in publishing means it is important to have several papers "in the drain". One sociologist recognised there was a distinction between publishers on this issue: "the biggest internationals are the best – quick to decide whether they will referee or not … The smaller journals are the worst. I always send to bigger journals first, because I know they are quicker".

The problem of delayed publication also appears to have been worsening with time, with one academic describing a previous process time of three months, but, "[f]or my articles published in 2005 it took three years between being accepted and appearing in print. This huge margin happened in five to 10 years, partially because of universities' increased obsession with large [publication output]".

While some concepts in Sociology may be able to withstand very long lead times to publication, others are more contemporary and the delays are causing difficulties for the relevance of the articles in question:

> One [article] that is just published took six months to review. The changes to it took a couple of months then 7-8 months to publish. It was over a year … I kept having to update it. By the time it got reviewed it was only just hanging in there as a current event.

The conference conundrum in Sociology

This thesis does not explore non-refereed publication, and conference proceedings in Sociology were not part of the original scope. However, in Sociology, it appears that the claim by some conferences that they are peer reviewed is arbitrary: "[t]here is no correlation between the cost of the conference and DEST points. For example I paid $1000 to go to a conference and turns out I wasn't refereed". As one sociologist put it, "[e]ven conference papers that say they are refereed, everyone knows they are not. It is an error young people make, especially females".

As the interviews progressed it became clear that the area of conferences in Sociology is fraught with problems. One issue appears to be that stating the conference proceedings will be published does not necessarily mean they will emerge in a timely fashion as one explained:

> Many conferences bring out the conference proceedings three or four years afterwards, if ever. They are running at least three years behind on average. It is a real struggle to get people to do it. If you don't get it before the conference, good luck.

One sociologist said this problem of not knowing whether proceedings will be refereed means it is hard to make a judgement about whether to attend a conference or not because funds are very tight for these activities, and "[You ask] who are they [the conference organisers], will I bother? Is the conference publication driven?". Another explained that sometimes the conference organisers go through the process of 'peer review' but give such broad guidelines that most things won't get rejected. One described an upcoming conference which had "decided peer review knocks out 50% of the papers, which means people won't go [if they can't present a paper]". This concept of peer review meaning different things to different people is explored further in the section on peer review later in this chapter. When considering these experiences (which are a world away from the conference process in Computer Science, for example), it becomes easier to understand

how gulfs of misunderstanding develop between disciplines over different publication outputs.

Version control in Computer Science

When Foster and Gibbons (2005) undertook their research, they discovered that there was a need for document management systems in academia. Many papers are co-authored by several people who are often not at the same institution, and the problem of determining which version of a document is the most up to date is a perennial one. This issue was not mentioned by sociologists or the chemists interviewed. This is possibly because the sociologists interviewed tended to write single-authored papers and books, or only collaborate with one other colleague. The chemists, as discussed, have a system where despite papers having many names on the paper, the paper is often written by one person who is usually the most senior person on the team. Computer scientists, on the other hand seem to do much more collaborating on the writing of their papers, which is done as part of the research or experimental process. Several computer scientists I spoke to had found their own solutions to the version control problem. One described a self-devised system:

> Email is the first method of communication. One person has the paper at any one moment. You have the paper and a token. You send the paper and a token. You can only make changes if you have the token. We use LateX. One person makes the skeleton of the whole paper and if sections are independent we write one each. We have an agreement on notification.

Others described alternatives such as specifically created document management programs available, such as, "CDS or Subversion … these are concurrent versioning systems, they are very clever" which "allows multiple people to edit the same paper at the same time". One researcher described a version control system which alerts all the researchers if there is a change made by any of them. In that case, "[w]e typically will break the paper up into logical chunks. So any one person can work on it without conflicting with another author".

Another computer scientist described wikis being used in the initial brainstorming phase of the research until the work has "reached a certain state and starts to crystallise, we put it into LateX and it goes into a version control system … [You can] make changes and commit it back in". Computer Science researchers work towards hard deadlines of conference submissions, and a couple of interviewees mentioned the benefits of working with colleagues in Europe and the US which means a paper is being worked on constantly,

"[b]ecause the paper gets worked on 24 hours a day then, this is quite a common thing nowadays". Another described this as "pretty much tag-team writing on the papers".

Publication turnaround in Computer Science

As discussed earlier, computer scientists choose to publish in conference proceedings to communicate with their community. The conferences happen at particular times each year, for larger conferences the submission deadline is the beginning of April, with acceptance/rejection notifications in mid June and the conference is in September or October. This means the submission times each year are rigid, as one explained:

> Submission takes about half a year, local conferences about three months. Once papers are selected – organisers advertise it with a link to the list of papers accepted about one to two months before the conference. Review acceptance is back within two months. You have two to three weeks to correct them then you resubmit the final version. You submit the whole paper – final version, three months before the conference.

The conferences are timed for the convenience of the Northern Hemisphere researchers and it can be problematic for Australian computer scientists who are trying to submit Australian Research Council (ARC) grant applications and prepare and deliver semester one teaching at the same time. As one explained, "International conferences have deadlines which overlap badly in the academic year". There is a second round of conferences, said another "[a]nother conference is in the middle of second semester. I have to write it in the break, it is because they are in the US and Europe, it is an advantage for them".

Computer scientists also publish their work as journal articles but this is considered a secondary form of publishing. There are several reasons for preferring conferences as a publication outlet, one is because the Computer Science community values conferences over journals. For example one said, "if you are published at conferences it carries a lot more weight". This means that work doesn't end up in journals, explained another "particularly in computer science, many conferences are as prestigious or more prestigious than the journals". This situation is not necessarily recognised in the non-Computer Science community, said one interviewee, "outsiders think journals are great".

However, not every conference in Computer Science is highly regarded. One interviewee who had a Mathematics focus, dismissed conferences as a publication forum:

> The conferences [in Maths] I go to will allow almost anyone to speak. You send a paper in and unless you are a crackpot you can speak … It's up to us to decide to submit a paper post speaking – that's refereed. It piggy backs on the reputation of the journal.

Computer scientists also publish articles in journals, and it appears that these articles are often a 'compendium' of research that has already appeared in conference papers. Comments like "you use journals to collect a bunch of papers and collect them up to become a journal article", were made several times. The issue is one of speed said one of the computer scientists, "the turn around for journals can be two years, it is awfully long", so as one person described they "publish conference papers I first want to get out quickly. Then after I publish one or two papers in the subject, I collect conference papers and publish in a journal".

Many computer scientists mentioned that journals play an archival role with one person saying:

> You have a result, you submit to a conference – it is a form of extended abstract. When it is communicated to the community you write it up and submit it to a journal. Journals are for documented purposes – it doesn't matter that it takes a long time.

Another, not insignificant reason for publishing in conferences over journals is the comparatively long time journals take to publish articles as one explained, "journal papers drag for one and a half years. It's why people don't publish in journals". As a result, some researchers in Computer Science simply don't bother with journal publication because "journals are the repository of established knowledge not the cutting edge. The turnaround on a journal is between three months and 12 months, by then I've been to four conferences".

Again, this leads to a fairly dismissive attitude to the value of journals as a publication outlet, "in the Computer Sciences lots of people don't even bother publishing in journals because it's such a fast moving field, the peer review process for journals takes so long". The general consensus according to one interviewee is "if you want results out quickly, you go to conferences … The first feedback a journal gives about reliable indication whether it will be accepted is four months. I think that's too long".

Part of the reason why the time to publication is an issue in Computer Science is because as one person said, “Computing moves so fast”. This sentiment was expressed in several ways by interviewees such as, “the field is fast moving”, and “stuff is moving so quickly”. This means work can become out of date and irrelevant very quickly said one person: “Because I am researching in the area of the web – it’s changing everyday. If [my research is] not out in one year … it will go nowhere. One paper out of six or seven will go nowhere”.

The layout issue, while a point of contention for some computer scientists in terms of feeling that the researchers are having to do the work, at least does not cause difficulties in the way it does for chemists because conferences tend to use a standard format explained one computer scientist, “it is almost always 10 pages of 9 point or 8 point. We have style templates and it is basically the same for almost everything we shoot for so we hardly ever think of that”.

Choosing a publishing outlet

One of the questions asked in the interviews was what considerations the researchers have when they are choosing which journal or conference to send their work. This is relevant because if one of the considerations is the cost or the long delay before publication, then open access dissemination options may be appealing to those people.

How chemists choose where to publish

Many chemists interviewed choose their target journal before writing their papers (although some specifically said they do not do it that way). This might be because of the appropriateness of the work, as one explained: “I decide how good the research then I choose the journal”, another said “[I decide where to publish] early in the piece … I try to target research towards high impact journals. Sometimes the outcome is as good as hoped for”. One reason for choosing their journal before writing is the different formatting requirements of journals. One chemist said: “I decide first [before writing a paper] where I am going to send a paper because each journal has different requirements in writing”. More than one chemist mentioned the format problem, “the format for a certain journal – you get it prior to starting. Diagrams formatted for specific journal. [It is] not complicated – just semantics. Certain journals have length and content restrictions.”

Other people make their choice closer to the time of writing the paper, with one person saying that is when “we send [papers] to the most exciting journal we can reach”. Often

this decision is made, said another, "on the type of work rather than the length". Another said:

> [I make a] decision towards the end when I am writing a paper. I start with a relatively small number of journals that I send to. I might change my mind. It depends on the content of the paper.

More than half the chemists mentioned the necessity to choose journals with high impact factors, with one explaining "you have to play these games. Impact factor is a factor in a decision". Another researcher also mentioned games:

> [Publishing in the right journals is] increasingly important. My personal view is it's a load of nonsense but if you don't play by this game you lose out. If a chemist publishes in a journal with a high impact factor it is irritating because it is the same paper regardless of the journals.

As a group their awareness of the concept of an impact factor was high, one chemist said they typically publish their work in the "highest ranking journal devoted to Organic Chemistry". Another said, "you try to select the audience by choosing a particular journal. All of us want to get in the highest ranking journals". One person showed a very high awareness of the use of metrics to judge work, mentioning the bibliometrics company ISI (now Thomson Reuters):

> ISI is a factor in the choice of journals. The choice of journal equals the quality of research. If it is outstanding send to general science journal because they have a very high impact factor. Impact factor is very important. It is good enough for general scientific literature rather than just chemists. I have never not sent a paper to a journal because they are too slow. The quality of journals comes first.

Some of the chemists described irritation that their American counterparts appear to be disinclined to take any notice of Chemistry undertaken anywhere else in the world. There is a degree of frustration with the situation: "Americans only read American literature. People will crawl over broken glass so Americans will read it … You have to publish in the US if you want to be read".

One (late career) chemist bucked this trend, stating that they published in the same place, regardless of the impact factor issue:

> Over time I have found I published where I have in the past. Not much else. People push more on citation rates and go to a different journal because [it has] a higher impact factor. In general I don't do that.

Another chemist argued that search engines ameliorate the necessity to publish in certain high-ranking journals, and while this may be true for reaching the target audience of other chemists, it goes against the reporting requirements for promotion. (This person was close to the pinnacle of their career path within the university, so issues of promotion may have been less of a consideration for them). This chemist said:

> [Factors to be considered when choosing where to publish include] the profile of the journal obviously. How much hassle or otherwise there is getting things into a particular journal. I don't like double handling so I tend to aim for journals that I am pretty confident things will get into. My argument being if it is a sufficiently significant piece of work, regardless of the forum, because the search tools are now so potent, if it is significant enough it will get picked up.

One chemist mentioned publishing in an open access journal, although "it was not a factor in the choice, I published there for another reason". Another mentioned the fees to have a paper published, so there is at least some awareness amongst this community that cost is a potential issue in publishing:

> Choosing a journal, there is a timeframe. How easy is it to deal with, the attitudes of the editors – how may iteratives … Sometimes there is an electronic loading up system. How it looks. They give us a template – how we deal with figures. In Chemistry we don't have to pay journal fees. (Biomed often have to pay). *Journal of Electrochemical Society* have a fee.

How sociologists choose where to publish

The sociologists generally, when discussing how they choose where to send their papers, mentioned the problem of conferences and the politics with publishing – those replies have been covered elsewhere in this chapter. However, a couple of people indicated that the choice of publication outlet usually came after the piece was written. In addition, the 'fit' of the journal to the work was more important than the impact factor:

> When I choose a journal, it is who is the most likely to publish. If the work is Australian focused I use Australian publishers. The topic dictates a narrow range of journals. Impact factor is not really a factor.

Another mentioned the open access option: "do you send it to commercial journals or to readily available free to all journals?"

How computer scientists choose where to publish

In Computer Science, the prestige of the conference appears to be a primary factor in their choice of publication outlet. As one said, "the decision of where to publish is mainly the reputation of the conference". Another interviewee said, "I go for the most prestigious ones. If I'm not successful then I drop down". The reason for this insistence on the highest tier conferences explained one person is "there is almost no value for publishing in tier two and below conferences … I call them write-only publications, you have written it but no-one is reading them. They will have no impact".

There was one computer scientist who bucked this trend and expressed a desire to avoid the big conferences:

> I am beginning to avoid large scale conferences. Mostly I publish in places with a long time scale – for journals I accept [that publication] doesn't happen in one year. Or small scale high quality workshops so you have people at a high level three to four days at one spot. Large scale conferences are more regarded as training ground for students.

In some cases researchers make decisions once the research is complete as one explained, "[y]ou will do the stuff and then … you would say what's the calendar for tier one conferences". As another computer scientist said, "the question of this or that conference is almost entirely [based on] subject matter. Mostly I am looking at international conferences … I want to send papers to what I think of as good outlets". Others make their decisions as they start the research process, for example, "I decide [where to submit] somewhere at beginning of research. There are four conferences I am aiming for, one in Asia, Australia, US and Europe. I know the deadline a long time ahead". Researchers who use this technique pitch their work accordingly, for example:

> I look at the program committee members – if someone is an expert in a field I tailor the paper to that person. Who is on the program committee. When writing the papers it is good to have in mind who the audience is.

One person said they committed to sending something to particular conferences each year, and worked towards that as a goal because they:

> … use the conference deadlines as a personal management tool. Sometimes it's the other way around – you are working on something that is ready to publish so you look around for what conferences can send to. By this time you are in the wiki or brainstorming phase then you decide on where to go.

The computer scientists who publish in journals described considering the suitability of a paper to the journal, then the impact factor: "where I publish depends on a spectrum of Logic to Computer Science where it [the paper] sits". Although, another researcher described considering a number of factors, for example: "how good a journal is, how valuable the contribution is. I consider the area – one paper can go to a few different journals with different emphasis, who is the likely audience for this work". The time to publication another consideration, explained another "there are a number of factors I consider … How long it takes for the journal to review the paper". Another researcher mentioned, "I usually choose a journal because of standards, the right topic, delays too long etc".

A less important consideration is open access options, stated one interviewee:

> you choose which journal does this paper suit? Then impact factor, the most impact for your job. If you are submitting with interest and impact you want to go to the highest impact factor. The next stage is if there is an open access option I will go for that.

When deciding whether to send work to a conference or a journal, the factors can include the length of the paper according to one person, "partly I consider length – six page conference paper or 40 page journal piece". Another computer scientist interviewed does not publish in conferences because of his/her industry focus:

> A lot of our work is published in books. Because I am on the industry side, a book is the best way of getting the message out. Opinion pieces. I am in software engineering – interested in taking science and developing ideas. [Computer scientists are] more traditional in their focus.

Summary of publishing issues

The three disciplines had greatly different norms in relation to the turnaround between submitting a paper to a journal or a conference, and being notified if it has been accepted and then until it appears as a published paper. The chemists interviewed tended to have high annual publication rates, ranging from three to ten papers. Almost without exception those papers are multi-authored. Publication in Chemistry appears to be moving quite quickly, with the chemists stating many journals have material out within two to six months.

The sociologists reported publishing in both journal articles and books. In general a publication rate of between two and five papers per year is average. The period between undertaking the work and publication can be considerable, with the interviewees reporting delays of a year to 18 months between submission and publication. The discipline is also highly varied, meaning that each individual would send their material to a wide range of journals and it would not be uncommon for two researchers in the same department to have a completely different list of journals in which they have published.

The field of Computer Science, which is split into many sub-disciplines, is very fast moving. Partly because of this, conferences are the main fora for disseminating ideas and work. The conferences are well organised and occur at certain times of the year which dictate the publishing patterns of most of the people interviewed. The Conferences are staggered, so if a paper is not accepted at a top tier conference, the author is notified in time to submit to a lower tier conference. The computer scientists explained they will consider publishing in a journal if they have a larger amount of material (sometimes several conference papers) they want to put together. Journals can take two years to publish submitted papers, and for this reason most interviewees stated journals are not the primary form of publication in Computer Science.

While some interviewees in Chemistry and Computer Science indicated they will write their work for a particular journal or conference, most indicated the decision is made once the research is complete, and in some cases after the paper is written. The sociologists who were writing articles tend to choose the journal once the paper is written. In all three cases the publication outlet chosen is a balance between the appropriate fit for the work and the impact factor of the journal (for those who are aware of this).

One factor in the publishing process relating to the high subscriptions publishers charge that emerged in many interviews was the layout requirement placed on the researchers by the publishers. This takes time to comply and irritates people, particularly in Sociology and Chemistry. There was some scepticism amongst the chemists who concluded that the reason why publication has sped up recently is because the journals now require authors to do a large amount of the formatting. Several chemists described limiting their publishing outlets to journals where they had worked out the formatting. Many computer scientists said they often have to provide a camera-ready copy of their work for publication.

Copyright

The issue of copyright is central to many of the arguments for open access (as discussed in Chapter 2 and Chapter 3. The questions about copyright asked in this research were intended to establish the awareness of copyright status of the interviewees' published work:

- *What is your understanding of the copyright status of your academic work?*
- *Is copyright an issue you consider? Does the copyright status afforded by a journal affect your choice of publication?*

As is shown here, the answers to the questions gave an indication of whether researchers consider copyright to be an issue that needs remedy. This is important in terms of open access advocacy, as the level of satisfaction or otherwise with the system would inform the level of emphasis any open access advocate would place on this issue.

Copyright and Chemistry

Many of the chemists spoken to were not concerned about their copyright arrangements with publishers. As one said: "they take on the risk of publishing. I don't pay a cent to have my work published". This was not an isolated sentiment, with another chemist stating: "I am happy for publisher to have copyright, they have to earn a living". In addition, this interviewee suggested that signing copyright over to the publishers "helps people not to publish the same thing twice. … A lot of chemistry is being recycled, especially if the first journal is an obscure one".

Only one person described copyright as protecting the author, not protecting the publisher:

> With copyright – the published work is the property of the journal, an individual researcher is not supposed to make a copy but everyone does. If you have SciFinder, access then you have access through the library subscription. If you made a copy you would be breaking laws. No it doesn't affect me. All the stuff I download I have the right to print it. [Copyright] has not got in my way.

The chemists generally had a clear understanding of copyright with several specifically stating that they sign copyright over to the journals. According to one person this arrangement means they are "allowed to use my material for private use". They also understood this contract means restrictions such as: "I don't have a paper up anywhere on the web. It doesn't worry me in practice. I never dispute it".

The main issue with copyright expressed by the chemists is the requirement that they ask for permission to re-use their own work. While some appeared not to find this onerous with one saying, "I have had to ask permission, they never have a problem", and another saying, "I haven't had any problems. If want to use something I write them a letter and they say its fine", others were not so sanguine:

> It's annoying to write to a journal to use your own picture. The journal owns the way to write down and the figures, it doesn't own the idea. If [you are] writing a review article so you need to include your own figures, you must write for permission. Usually the publishers are pretty good. One journal charges you – *Science* or *RNAS,* it's $20.

It is re-use of figures which came up most often in the discussions with chemists about copyright. Another interviewee expressed irritation at having to approach the publisher for approval, and stated: "Most of the time I ignore it. If I'm writing a book and quote others I do the right thing. I don't think it's much of an issue for scientific publishers, they are pretty relaxed. It is more serious if it's a book". One way of avoiding the permission request is to relabel or crop images to make them different enough from the original so copyright is not breached. One interviewee said: "Most journals ask you to sign your rights away. I don't take it very seriously … I tend to crop [figures] and make them different. I have asked permission on a few occasions. It is a tedious drag". Another said they employed a similar tactic:

> If it comes down to it, you need to get copyright permission. I have never done it, I got around it the couple of times I needed it. You can reproduce the data in another form, so avoiding copyright but conveying the information.

While these copyright rules are obviously not too problematic for some chemists with one stating: "the copyright situation doesn't affect my choice of journal", another made the distinction between for-profit and society publishers: "Indifferent is the best way of describing my attitude [to copyright]. I don't mind with societies, but commercial journals – we provide everything, the refereeing and content and they charge us for it". Another mentioned the primary role of journals should be distributing work:

> Most journals retain copyright, we have to sign a statement. Some allow me to distribute pdfs – if they are free online I don't have to obviously. I don't care [about breaking copyright rules] – what matters is whether the article is read and cited.

There was only one example in this group of interviewees of a chemist placing their articles onto a website in defiance of copyright laws:

> On my personal website, when I submit a paper I sign a copyright statement. Here I am making papers available. That may well be in violation of that copyright. I haven't ever been called to task … I doubt the journals mind the papers being distributed in this way … I don't want to undermine the journals. The number of copies taken [from the website] are quite small. I can monitor this – it is in the 10's. My feeling is it is not likely to upset anyone. If I found (my papers were being) downloaded in huge numbers I would feel different to the journal.

Copyright and Sociology

The sociologists interviewed were generally unaware of or not interested in copyright rules. A few described their understanding as variously, "pretty vague", "very poor" and "I'm ignorant of it". At least one interviewee expressed a similar sentiment as the computer scientists: "If I want to reprint I suppose it's OK. If I didn't officially have permission, I'd do it anyway. So far it hasn't stopped anything".

There was a sense of helplessness in at least one answer: "I signed copyright release form. I can't say no to this, they won't publish". This concern about publishers refusing to publish if the author tries to object to the copyright arrangements is one that is shared in this academic community. Some respondents appeared to be resigned to publisher control of copyright, with one saying "authors have very little control whether work is distributed or published".

However one of the respondents referred to copyright from the perspective of something that protects them, rather than the publisher: "The system protects me from people exploiting me and people photocopying excessively. I don't understand the nitty gritty". Another described their lack of concern about the copyright situation because the publisher is "good enough to publish something. They are taking the risk". This person then stated: "I have no problems whatsoever. Some people complain but they are commercial businesses out there … There are lots of interesting things happening in copyright".

In contrast, at least one person expressed disgruntlement at the copyright situation: "I have absolutely no control over it, financial or other interest in it, that is signed away when we publish. I don't like it, it is very exploitative". They then stated they were

considering "trying other journals and others may feel the same way as I do … The fact that neither I nor the university nor the taxpayer see a return on the investment grates".

Sociology differs from the other two disciplines examined in this research because many of the interviewees have published books rather than (or as well as) journal articles. The copyright rules for books are very different to those for articles. One person interviewed who had written several books had taken it upon themselves to find out about copyright by joining the Australian Society of Authors which helped them negotiate "a contract with Cambridge University Press … The society insisted on copyright – and since I have asked every time".

Another described a lack of concern about the situation: "The copyright varies from publisher to publisher. The book publisher, they retain copyright. I get royalties. It is not a problem, all it means is I can't reuse material for commercial purposes without their permission". Authors often reuse their own work from papers to put into books, but this is not a problem from a copyright perspective because, as one explained: "Most journals take over copyright but will release it back to you if it is for you to put somewhere else in your other work". They are prepared to do this, the researcher maintains, because: "They are very happy for you to reuse your work in the context of helping it further, with acknowledgement".

Copyright and Computer Science

Some of the Computer Science individuals interviewed had a good understanding of copyright laws, with one describing the situation: "[for] many conferences you sign a copyright form and fax it off. Some allow personal copy on your home page". Another said: "I can distribute it for non-commercial purposes [a preprint]. But I should put a link to the publisher's website. For journal papers – some journals make their copyright available for public access. So far they have been open access journals". One interviewee had specifically checked whether s/he was allowed to put their work up:

> You are generally asked to sign a release. From then they have copyright of that publication. Depending on the conference you may have the ability to put up a version on your website. Usually not the final version. I specifically went to look at copyright form which said you can do this [put things up online].

Some computer scientists felt that it was their right to put their work up regardless of the laws. As one said: "I believe the copyright is with me unless it is signed over to the conference … it is not a concern". However, several computer scientists interviewed took

great care not to contravene their copyright agreements when placing work onto personal webpages. There appeared to be a clear understanding of the difference between the final peer reviewed author's version and the publisher's version:

> "If I am published I have to sign the copyright to publisher … They let you put preprints on the webpage but not the final published article … On my personal site it's the version sent to publisher past refereed and not final edited.

Another researcher described 'publication rights' that lie with the publishers, but that it is in the "interests of the community that papers are available electronically". S/he said that if they had submitted a final version pdf they put that up on their site, "but if you hand in your work to a high level journal – the editor resets, typesetting, layout then reproduction rights lie with publisher, I don't publish this pdf file".

That said, many of the computer scientists interviewed simply place the publisher's pdf up on their sites in flagrant disregard for the copyright agreements they have with their publishers. Some interviewees were simply unconcerned about the copyright issue, with a typical statement being, "I don't worry about copyright policies". Another described the situation thus: "Other people cannot make a copy for commercial but can for private use. I don't consider it much – all the places we publish in they own copyright".

The philosophical attitude appears to be that if enough people do it the publishers won't chase everyone, with one explaining: "I have discussed this with colleagues, the general feeling is it's so unlikely publishers will chase you up. The advantages to community outweigh this consideration. It's a calculated risk. I don't think the publishers want to look silly". This behaviour is quite deliberate, as another stated:

> If the lawyers come after me with a nasty letter I will say I'm sorry. [It has never happened] and that's the point. Many academics are paranoid about that. Yes, technically I'm breaking copyright. But then realistically is Springer going to come after me and the guy next door and the guy next door etc. What they will do is they will go after aggregators who do in a systematic fashion … Sometimes [on my site it] is the publisher version, I mean that is the naughtiest thing you can do but again if they ever write to me and say bad boy I can take that down. In other cases it will be the typeset version that was submitted as the final copy to the journal. I mean the formatting and the page numbering is kind of irrelevant usually because you can always refer to a section or something. I mean the only advantage of the journal version is accuracy of referencing.

A variation on this perspective is that while the publisher refrains from contacting researchers about putting papers up on their site, this serves as tacit approval by the publisher as one interviewee explained: "The pdf I use is sometimes home grown and sometimes the publisher's version … I haven't asked permission [to put pdfs on my site] but I have had no problems". Another said: "I guess most publishers of work retain copyright over material. All the stuff on the web probably contravenes the lettering of copyright … Publishers aren't bothered about you putting up papers on website as long as that's all". It seems that this area is a 'grey area', as one said:

> If you are published you have to sign the copyright to the publisher. For conference/journal articles I don't care much, partly because publishers are very lax because they let us do things. They let us put preprints on the webpage but not the final published article. Many things are grey as long as you don't do anything that cuts into the profit.

A couple of people indicated that they addressed the problem by acknowledging the publisher with their paper, for example: "When the paper is available online I put a link to publisher's copyright thing. I don't know what it [the copyright status of work] is, it's never been an issue". This arrangement appears to be endorsed by at least some of the publishers according to one person:

> I'm hopeless on this front. But my professional organisation, the ACM (Association for Computing Machinery) has, this is my understanding of it, they are very good on this front and they allow us to make our work available on our web page with an appropriate disclaimer and I have that disclaimer on my web page in fine print at the top. I forget exactly what the words are but it's a paragraph or two of legal disclaimer, then I can make my work available immediately and that's what all my colleagues do. So we make our work immediately available.

There were some computer scientists who were aware of the copyright situation and were annoyed by it, after all as one stated: "What's science for if you don't have things available?". There was some irritation that they were forced to use publishers and sign over their copyright: "When you publish an article, you sign copyright to publisher. I will still send material to them – because they are non profit … I know it's not the right way to do things". One respondent commented that open access journals don't retain copyright but most journals do: "I find it rather outrageous – I can't send papers to other people (not that it really stops this happening) I can't put papers on the web to download". Books pose a different problem: "If publishers [of books] don't allow copyright to be picked up under

open licence it is a waste of resources. With big publishers and with books it is a case-by-case basis".

One interviewee was the editor of an open access journal, who obviously had a very clear and precise understanding of the copyright laws, describing their journal as:

> … innovative because we don't take copyright from authors. … We were told there would be problems but there is no issue. We ask for a permanent license to publish. Otherwise author retains ownership. Authors can publish elsewhere if they leave a note that it is published elsewhere. The system is working fine. The extent of the product is quite defined. It is clear what authors are allowed to do. So we have a one paragraph agreement the author sends in. [There is] no Copyright transfer.

Summary of copyright responses

Overall copyright does not appear to be a major concern for the people interviewed. The reasons why, however differ considerably between disciplines. The chemists generally had a clear understanding of copyright with several specifically stating that they sign copyright over to the journals. Many of the chemists spoken to were not concerned about their copyright arrangements with publishers. The one copyright issue that emerged in the interviews with chemists was the need to ask permission to re-use figures in subsequent publications, but even then the respondents were either not concerned about this, or altered the figure so they did not have to make the request. The sociologists interviewed were generally unaware of or not interested in copyright rules, with a couple stating that copyright protects them from plagarism. A few expressed a concern that a publisher may refuse to publish if the author tries to object to the copyright arrangements.

The computer scientists interviewed generally know what their copyright obligations are. However many are choosing to ignore them. Computer scientists have a cultural expectation to maintain a personal website that at the least lists, and usually links to, copies of their publications. Depending on the publisher, there may be no contravention of copyright if the version of the paper they make available is their own final, corrected, peer reviewed one (sometimes referred to as a post-print). However, if the academic places the publisher's pdf up on the site this is contravening copyright laws. Publishers provide pdfs to authors as a modern version of reprints, they are intended for distribution to colleagues who request them and there is often a restriction of about 25 distributions. The pdf is not provided to the author for general publication on a website. Despite this, many of the computer scientists interviewed simply place the publisher's pdf up on their sites in flagrant disregard for the copyright agreements they have with their publishers. The

philosophical attitude appears to be that if enough people do it the publishers will not chase everyone.

Grey literature

Generally grey literature refers to the supplementary data and background information that surrounds a research project. This material is not included in the final journal article or conference paper, usually due to space considerations.

The answers described here are in response to the questions:

- *Does your research generate any supporting data?*
- *What do you do with supporting data for your research? How do you store it?*
- *Have you or would you consider placing it into your institutional repository? If so would you put open access status onto it?*
- *Have you ever received requests for supporting data? If so how often has this occurred and have you provided the data?*

Amongst those interviewed, the chemists and computer scientists seemed to be inclined to provide data but this was not the case amongst the sociologists.

Chemistry and supplementary data

There are distinct disciplinary differences in the amount and type of grey literature created, made available and used. Chemistry produces several types of supplementary data, and most supporting data that is already in electronic form is already submitted with the journal article explained one chemist: "The paper is two pages but there might be 40 pages of supplementary data with detailed experimental data. Most people never look at it. It is sent in with the paper and the journal tags it as supplementary".

In this instance, grey literature consists of supporting information and data which may be attached to the relevant paper. Chemistry journals have protocols about supporting information which sits behind the article on the journal website. One example is the European Journal of Inorganic Chemistry: "A manuscript may include electronic Supporting Information which will be accessible only on the WWW. Authors must keep a copy to make available to readers who do not have access to the internet" (Wiley Publishing, 2008).

A chemist who works with three dimensional studies said: "Most journals require you to submit the 3D co-ordinates for a 3D structure. … anyone with internet access can

download the structure for free. From abstract they find co-ordinates and they can access the data". This provision of background information has now become centrally important to the field as another explained: "We write a paper about structure but also submit coordinates – as important as the paper. You need to see them to get a full appreciation. Many meta studies based on that data – large scale analysis of protein databank. … The quality of structures has improved as data is forced to be available – people take more care over it".

The limitations of the journal article length requirements mean the experimental details in the journal are abbreviated, but as one chemist explained "the full experimental is given, it gets refereed and it's available on the web. So if you read the journal, after you can go to the web and access it".

An alternative is to publish that information separately. Many chemists publish short 'communications', and some argue that: "that the package of the communication and the supporting information is in one sense a bit like a full paper". In the cases where the supporting information is not required by the journal explained one person: "we might publish there first and then follow up with a full paper which expands upon the material in the original communication, to which we have added all the experimental detail". Despite all of this potential to have all the information available, the system does not always work said one chemist: "Some articles are poorly written, I have on occasion contacted the authors directly. They have been helpful but not always able to provide the information".

OECD principles about the openness of data do not refer to background information such as laboratory notebooks, preliminary analyses, and drafts of scientific papers, plans for future research, peer reviews, or personal communications with colleagues or physical objects (e.g. laboratory samples, strains of bacteria and test animals such as mice) (OECD, 2004). Interestingly, several chemists referred to this sort of data when I asked about grey literature, with one saying: "We have got to keep primary data for seven years. I am very rarely asked for it".

Another person explained that, "people write and say they want a spectra so you can dig it out of a file". This type of supporting data in Chemistry is often kept in boxes in the researcher's office. In many cases the interviewee opened a box and showed me the material (which was one benefit of conducting the interviews in their office rather than in a neutral place such as a meeting room). This was a fairly typical explanation by a chemist at this point in the interview:

> I think what you are talking about is the hard lab notes and spectra. Can you see all those plastic boxes? I accumulated all of that when we moved because I had a much bigger office and some of this in labs as well and we have a much smaller lab space. So the names on them indicate whose files of spectra they are. I've thrown away a lot of stuff published a long time ago. I think we are supposed to keep it for 5 years after we have published.

Grey literature and Sociology

Of the three groups the sociologists had the least amount of grey literature. Many of the people interviewed were undertaking text-based work, which meant they were not doing empirical research that generated data. Of those that are, there are specific protocols about keeping data, as one explained: "I have an office full of boxes of questionnaires. Ethics said originally I must destroy them after five years, now they must be kept under lock and key for seven years". In addition there are specific data archives in Australia that deal with social science data sets, such as the Australia Social Science Data Archive[xl], but possibly due to the nature of the information being collected, there appears to be something of a reluctance in depositing data into this archive:

> With grey literature I don't do anything … I could make my data sets publicly available … Data is not free – even ANU data archives you ask who gets access to data and why – people are willing to make money out of it. … I use their data but I don't put mine up.

Systems for retaining data in Computer Science

Of the three groups interviewed for this project, the computer scientists appeared to be the most cognizant with data storage systems, even if they chose not to use them. For example:

> My work doesn't usually have supplementary data. My papers are reporting developing software. It is sometimes normal to make it available in some way, put it in the public domain … [the data] sits on its own server, there is a link in the paper. We are supposed to keep data to reproduce results we claim. It is not always trivial either if the results are very experimental software. We have a system, I don't always use it.

The supplementary data or grey literature in Computer Science tends to be software, and often this is written as open source software, so is in the public domain anyway. Computer scientists use several techniques for ensuring the supplementary data ends up in the public domain. In the same way chemists publish full papers instead of communications to 'flesh' out results, computer scientists will publish longer journal articles after conference

proceedings to publish the full detail of their work. These journal articles contain the grey literature explained one person:

> I never get requests for grey literature, and have never asked others for it. One of the reasons is you publish in a conference to make work known and you later extend it and put it in a journal paper so most grey literature is in that. I would go to the author's home page to look extended journal paper. I try to find information on the net.

The general philosophy of computer scientists making material available on their websites extends to the supplementary information and software behind their work said another: "Some journals offer space where you can put supplementary material, otherwise you put it on your website. Most bioinformatics journals expect you to make software available and won't publish unless there is a link to the software".

A couple of interviewees mentioned open access journals which "require software to be open source". One person explained one open access artificial intelligence journal allows "supplementary material – software or experimental data – [to] be archived on their journal site". The Computer Science community has found alternative ways of making the material available, such as Technical Papers relating to the research. As one person said, "If it is important we will put it out".

When describing their own stewardship of this material, one interviewee specifically articulated their concern over the university's ability to cope with data:

> I should say I don't just make my software open, but in many cases I make my data open as well, and to some extent they wouldn't know what to do with some of that data. So its more a practical concern about these institutional repositories actually being able to be kept up to date and getting into a format they are happy with when I can just do that myself and if I collect a new dataset, it will take the institutional repository 6 months to update it whereas a person visiting my website can see it. So it is more an issue of practical control over conceptual objection. But just having dealt with libraries in the past it is sometimes easier to just manage it yourself.

There were problems with data control even at the departmental level. One person expressed their frustration as follows: "This is the Computer Science School and nothing is automated. I am trying to get a system to manage data for the school". At least one of the interviewees recognised that there could be a possible use for a repository as a place to

deposit grey materials: "When you submit to a conference – it is not all the detail, you put extended papers on your website. This is another reason why repositories are useful, you could put all your grey materials in the repository".

UNSW has introduced a set of protocols about research data after one of its research staff, Professor Bruce Hall, was revealed as fabricating data by the Australian national broadcaster (ABC Radio National, 2002; ABC TV, 2003). These protocols were described by several UNSW interviewees, with one saying: "UNSW has special policies about data and archiving - after the Dr Hall incident it must be burnt onto DVD or CD Rom". Generally speaking, according to these protocols, data must be held within the school that generates it, for a minimum of five years (UNSW Academic Board, 2004). There is no mention in the policy of the use of a central repository, or on-campus data services.

Summary of questions about grey literature

The long term preservation of grey literature was not a major consideration for any of these three groups. The questions on grey literature were originally asked in this research project because grey literature is one aspect of publishing for which repositories may be able to provide a solution. However, overall, the responses to this question were patchy, and not very illuminating.

In Chemistry often supplementary material is supplied to journals with an article and is available on the journal's website. The chemists also keep spectra (the raw data from their lab work) in their offices for several years. Of the sociologists interviewed, many did not have data, because they did not undertake empirical work. Those who do create data said they were disinclined to share it because of privacy issues. The computer scientists said they tend to produce open source software which is in the public domain anyway, but possibly because of their culture of sharing, many recognised the possible benefits of putting Technical Papers into a repository rather than onto their own websites.

Peer review

This section describes the answers to the following questions about peer review:

- *Have you ever reviewed a paper?*
- *If so how many papers would you review in a year? And how much time would this take?*
- *Are you on an editorial board of any journals? How much time does this take up?*
- *Is this something you sought or that you were asked to do?*
- *Have you been compensated in any way for that work?*

- *How do you feel about reviewing (is it a positive or a negative task for you and why?)*

In conducting these interviews, it has become obvious that disciplinary differences extend far beyond simply the publishing channels used, encompassing; a publishing framework, attitudes to the 'training' of new researchers, the type of contribution expected by the community, right down to the language used within the discipline. These differences are also evident in the peer review practices of each discipline.

The time researchers spend reviewing

Chemists publish a large number of papers and because of this, there is a resultant expectation to review a large number of papers. One explained: "You should referee at two times your publication rate". The time allocated to refereeing varies considerably between individuals, but some people spend large blocks of time on refereeing. For example one said: "I peer reviewed about 70 papers last year, and knocked back a similar number of requests". Others, by comparison are doing much less, for example: "I would review three or four papers a year, and one or two grants per year. Grants probably take longer. Papers take a couple of hours each".

A couple of chemists mentioned being overloaded with reviewing requests, with comments like "I think I've been reviewing too much" and "I am refereeing too much" not uncommon. This load means that many people are rejecting requests to referee. One example was: "I have normal volume - every two to three days I get a request. I don't accept them all". The task of refereeing alters depending on the quality of the journal, as one person explained: "The effort for top ranked journals is greater. About half a day – [I have] never quantified it – it takes an enormous amount of time". The type of paper can also affect the time spent on the task said another: "I normally spend an evening, reading it and writing a report. If there is a dispute, it's half a day at least. Refereeing review articles can take days". One of the chemists said:

> The ones that take the longest are the ones that are closest to borderline. I can see quickly if they are complete rubbish or with others I can see they are superb. It only takes one hour. The difficult ones that are borderline is good stuff badly presented - and they can take multiple hours. About one day a month I spend [reviewing].

The role of refereeing can often be wider than simply reviewing individual papers. Several chemists mentioned being in other roles, which adds their normal refereeing load. One example was: "I'm chair of the editorial advisory committee of [a journal]. I am called on to

do adjudicative decisions. I have to weigh up judgement of two or more referees. Once a month I have to review the reviewers."

In Sociology the publication output is a mixture of books and journal articles. Obviously books take considerably longer to review, explained one person:

> Sometimes I spend a couple of days reviewing. I try not to rush because they are usually large projects and I don't want to be assessing someone's work quickly. On other occasions I spend as much as three weeks (on and off). It takes a bit of time. I review a couple of books a year, and four to five papers a year.

As there are fewer books than journal articles published, some people don't have to review books at all. That said, the journal articles in Sociology are more comprehensive than a Chemistry communication, for example one person said: "I review three to four papers a year. They are about 5,000–7000 words. It takes about three quarters of one to a full day for the whole thing". Other estimations of the time to review Sociology articles are considerably higher:

> With journal articles I'm pretty fast at it now, usually two days unless it is a very complex article or unless it's an article that I think should be published but it needs a lot of work done to it and then it might take nearer to four to five days

In Computer Science most reviewing is of conference papers, which tend to come in one group with a short and specific deadline. This can cause a great deal of stress during that period, as one person explained: "I am on two program committees a year which require about 20 papers each. Each paper takes three solid work hours". This researcher said that s/he dedicates a week to the task of reviewing the papers, but when the time taken to travel to committee meetings in the US is taken into account, "Altogether it's three to four weeks a year." Those people who head up panels are responsible for organising the reviewing of many papers, for example:

> Because I am on a panel, I get about 200 papers per year to review. There are 15 people in the lab. I personally review about 40 but glance over the others … Sometimes I work very long hours when refereeing comes around.

The amount of time an individual computer scientist spends on each paper varies, with answers including, "half a day to a day reviewing a paper", or "if it is a really familiar topic

it takes 15 min or up to 2 hours for a long one" and another person saying "it takes four to five hours but varies, it can take two hours or 30 hours if they deserve more than a day". The average appears to be about five hours per paper. The number of papers can vary considerably too, from "four to five papers a year", to "about one per week", or "three papers per week – on average".

Computer scientists split their refereeing time between reviewing a block of conference papers at a specific time and journal articles, for example, "I get a lot of conference papers and agree to two to three journals papers per year". Journal articles, while spread throughout the year, take considerably longer to review said one: "[Refereeing] takes one to three hours per conference paper, and one to three days per journal paper. People expect you to be thorough and the article is longer. The papers are coming in all the time". This disparity in the amount of time required to do the refereeing was commented on by several computer scientists: "Journal papers take much longer - 10 hours to read, check proofs, write a response". Another described taking even longer:

> For journal papers, I spend a week doing reviews, they tend to be longer and more technical detail. The standards are higher than conference papers [they are] meticulous. It is not like you are continuously reading the paper. I spend an hour or two reading. When its material I'm not familiar with have to look up the literature and read the citations – that's what takes time to get a feel for the importance of the work.

Peer review as a community expectation

Despite considerable discrepancies in the amount of time individuals devoted to the task, across the three disciplines, most researchers felt that they were contributing to their field by undertaking peer review, it was expected.

For example, one of the chemists said: "It's a service to Chemistry, it cuts both ways - if you send something in you are expecting others to referee. I'm basically a good citizen", and a sociologist remarked: "The university pays me to work full time. If that includes reviewing, marking an honours thesis for a scholar, or writing a job reference for someone, it is part of the job". A computer scientist explained that: "Community service is part of the job. You appreciate when you get good reviews back with thorough critical assessment. I try to do the same".

Peer review even offers some benefits to the reviewer. Positive comments about undertaking peer review included the ability to have early access to papers that were in the reviewer's field. In several cases, researchers use the papers sent to them as part of

their attempts to stay in touch. For example, a chemist remarked that: "I like refereeing because I get to keep up with the literature and get to see what the journals think is good stuff", one of the sociologists commented that: "A benefit [of reviewing] is it is one way of keeping up with the literature" and a computer scientist said: "I regard it as simply another form of research. It is an opportunity to read something I am reading anyway".

Somewhat surprisingly, an advantage of refereeing is its flexibility. Much of the reviewing work done by researchers is done outside of work time. Chemists in particular, who can be tied to their laboratories and computers when at work, seem to appreciate being able to do this aspect of their work in a place of their own choosing. One explained that: "I read the paper on the way home and write it up on the way in, I quite enjoy doing it". Another said: "There are benefits to it … I can do it away from the office because with Chemistry you are either in the lab or next to the lab".

Sociologists described doing refereeing in their own time, with one saying: "I referee articles and book manuscripts. They take a lot of time. A whole book takes three weeks of work outside the office". These perceived benefits are, however, comparatively small given the time spent undertaking reviewing, as a chemist expressed clearly: "When they arrive my heart sinks. I have always got other things to do". Another problem expressed by a sociologist is this is 'invisible work': "People try not to do it as it's a lot of work. It is time consuming and there is no way for it to be recognised".

Computer scientists also do this work out of office time. One described it thus:

> I read the paper twice, once to mark typos and comments, then I go through it again and write up a report. Sometimes it takes up to a day, between four two eight hours. Often they are done over the weekend. It is definitely extra work over what you do.

The difficulty with Computer Science is the papers are timed to come together and "If [I have] a batch [of papers] where I'm the expert it's onerous – it easily takes a day per paper. With 12 papers, half the month is gone".

While there is some research benefit to reading early versions of papers, the task is essentially an administrative one that is not recognised as such by their academic institutions. A sociologist pointed out that: "I think I do a lot [of refereeing]. There is no recognition … You can't put it in annual reviews to count for performance". A computer scientist mentioned that, "it gives you status within your community, which may not help your job. It's a lot of effort for not a lot of reward". One of their colleagues suggested:

> I feel it's a worthwhile contribution and it would be nice if some consideration was given by the department. The argument hasn't been fought but it will come up because of teaching. Some things count as a service to the profession, [reviewing] should be counted.

This lack of recognition has implications when considering the issue of increased reporting requirements from the university (which will be explored in greater detail in the Managing the Academic Career section of the next chapter). One of the sociologists summed the situation up:

> It's a tricky one because as an academic we think we belong to a professional community. We do things for no financial reward … The more the uni squeezes us and asks us to justify our time, I am less inclined to undertake reviewing. I still do it as an obligation to the community.

Payment for peer review

Some individuals were aware enough of the politics behind publishing to express irritation at commercial publishers making large profits based on 'free labour'. This was most strongly expressed by the computer scientists with one stating: "The attitude is, 'what do we get out of publishers?' They organise people in the community to referee within the community. If members in the community coordinated it then there wouldn't be much of cost".

In these interviews there was not a single instance of an academic being remunerated for their time spent reviewing journal or conference papers. In the past, some later career researchers had been offered book vouchers in exchange for their efforts, but tax changes in Australia stopped this practice some time ago. There was, however one Chemistry interviewee who had been offered a 'recognition' for reviewing: "I was once offered a 20% discount (on page charges) on publishing in a journal, if I decided to send a paper to them. I wrote a review for a journal and was given a free subscription to the journal".

Sociologists often do book reviewing which does incur some compensation – usually in the form of books, for example: "If I am given a [book] manuscript they may give me six books of choice from a publisher, but that's a surprise or a bonus". Another sociologist mentioned that:

> I probably do about three books a year (each takes about three days), and three journal articles (usually takes an afternoon). They usually give me £200

> [worth] of books from their catalogue. I get nothing for journal articles, for reviewing books I always get paid in kind.

Most researchers had been offered a payment for grant proposals and for marking PhDs and Masters theses. It appears the amount is arbitrary as one sociologist explained: "I have compensation only when reviewing a PhD or Masters. I received about $170 for reviewing it and a two hour teleconference". Another computer scientist said: "When I examine PhD theses from Australia and overseas, they offer money - $150-$200, its not worth it. I don't reply about the money". Not only does the amount not reflect the time spent, but some researchers like this chemist feel it is insulting:

> Being a reader for ARC takes about a month per year, there are about 25 grant applications to assess. The ARC gives us $30 for a grant application which takes at least half a day. It's a token amount – insulting. Most years I haven't bothered to claim it.

The difficulties of finding reviewers

Not surprisingly, given the amount of time the interviewees are spending reviewing papers (and there is nothing to indicate this is not representative of all researchers), finding reviewers for papers was raised as an issue by the interviewees. One Computer Science interviewee who was the editor of a journal mentioned this problem:

> Every year it is harder to find people. More people are not doing any [reviewing]. Often I have a paper where it is very difficult to find someone. We need to find more people. At some point in the future something has to change in the process. The whole system of refereeing has to change.

One of the reasons (other than the time commitment) that people are unwilling to review is that for some people, reviewing is a challenging task. One computer scientist said: "Sometimes I detest it, standing in judgement over others work. You see some papers obviously written to get a black dot on a scoresheet at the end of the year".

Several sociologists also mentioned the increasing difficulty in finding people to review papers, with comments such as "Journals are having increasing problems locating people to review your articles", and "Editors are having trouble getting referees these days". One sociologist offered the reason as: "It is difficult to get academics to do anything that doesn't count towards their CVs".

Another outcome of the difficulty of finding referees translates into an even longer period before an author can find out if a paper has been accepted. This may possibly explain some of the delays in publication in Sociology: "They had trouble finding readers for a couple of [my] papers. It took 6-8 months to find out yes or no".

This problem of finding people has translated into a game where people who are already doing a substantial amount of refereeing are being careful not to become too attractive to journal editors, as one chemist explained:

> They look for people who are prompt but like people that reject. It means they have a reputation for being more thorough … Most editors will have a database of referees. They will give you a deadline, I only send it just before deadline, or they will send you more.

It appears that requests for refereeing come from 'being known' within the discipline. For example in one chemist said: "Last year my reviewing grew. On average I did 10-15 papers, by the end I was doing two a month. In previous years I did much less. Once I hit their databases I got more". The same situation happens in Sociology as one interviewee explained: "The more I go to international conferences and know journal editors – the more obliged I am to do it [refereeing]". Another sociologist said: "As you are in an area longer you get to know more people and they know you and your work. More refereeing comes to you from a variety of sources". Computer Science also experiences the same phenomenon:

> I do a little bit of reviewing. I reviewed two papers a while ago. The word will start to spread now I've finished my PhD. The last lot came from a professor in the faculty who is the editor of the journal.

One Chemistry interviewee implied there are 'games' being played by the editors too, such as hand-picking reviewers to gain a particular outcome:

> I have a feeling that when the editorial staff look at something if it is marginal they give it to a reviewer who is likely to reject. I think in a sense some journals try and manipulate outcomes. I know they keep a profile – they send out a profile to you at the end of the year.

This idea that the editors of journals may not be prepared to make a decision was picked up by a Sociology interviewee: "If you have two reviews and one is bad one, the editor will say meet the requirement of the bad one. Editors are clerks now, not editors. No-one has

the courage [to say what they think]". There was at least one instance where a Sociology academic had been asked to review completely out of his/her field because of a particular skill they had: "I sometimes get asked to review educational jobs because I am competent in statistical analysis and I have to figure out what they are saying".

Problems with peer review

One of the requirements of reviewing is to establish originality of the work – a task made substantially easier now with electronic databases as ne chemist explained:

> SciFinder is indispensable for saving time. I first check it to see if the work has been done before – people do cheat. I do a quick scan of literature to see how novel the work is. But if I didn't have the benefit of databases, that would take a day, so before we would not do that. Refereeing is more rigorous now with databases.

But even now with electronic searches, it is not infallible, and the originality issue is particularly acute for researchers working outside America. US authors are more likely to be favourably reviewed than non-US authors by all reviewers, but when looking at only US reviewers, there is a significant preference for US papers (Link, 1998). The internal US-focus phenomenon is so marked that, particularly in Chemistry, there are instances of research undertaken in the US being published as original when the same research had been previously completed and published in Australia as one explained:

> [Americans] won't read other stuff like in the *Australian Journal of Chemistry* – six years after we published something, the same work was re done and published in an American journal. Nothing happened. It shouldn't happen but it does happen because the referees don't know about it and they don't have time to check. This was when I realised Americans don't read other's literature. They are incredibly insular but they do fantastic chemistry.

It appears that peer review is not always fulfilling the functions it is supposed to. When asked if there had been any instances of peer review not working, the answers the interviewees gave were varied. Some of the examples given were from the perspective of the interviewee as an author, and these have been detailed in the Rejection Rates section of this Chapter. Several people indicated that as far as they knew the system was working, but a few chemists gave examples where as reviewers of other people's work, things had not gone as planned: "in the most extreme cases I have recommended the rejection of papers that I have seen in print later". Another said this had also happened to them: "What I sometimes see is I recommend rejection and it gets in. I think it [the paper] is marginal, I

am surprised it surfaced. But the other reviewers have said yes". In addition to this 'publish anyway' situation, is where the Chemistry journal has mis-understood the role of a reviewer explained one: "I have been asked to take a word file and put suggested changes into the world file. I wrote to the main editor to say it's a bad idea".

One of the sociologists also described this experience of being expected to contribute to the paper: "Some people submit and are simply fishing for reviewers comments. That can be disconcerting. [You are] expected to become unacknowledged co-author on another person's work". A couple of sociologists expressed disillusionment in the review process: "The corruption around that whole field is pretty rampant. People take shortcuts, that's why there is a lot of pathetic work out there". When discussing their own refereeing decisions, a couple of sociologists indicated that they would like to reject many of the papers sent to them: "If I was going to be honest with reviewing, I wouldn't say yes to many things. I have to temper my criticism. The process is a compromised one".

One of the difficulties faced by peer reviewers is not to do with the quality of the research, but the way it is expressed. This is something that came up with a couple of the Chemistry interviews:

> The ones I find difficulty with are Indian, Chinese or Japanese because the grammar is so awful. I don't have the time to rewrite it. Is the content there? I tend to let it through as long as the content is there… You just have to accept that if they are not a native speaker their English is not great. You make allowances.

While it appears that the feedback from reviews is usually of a reasonable quality, in Computer Science at least, there have certainly been instances when it has been less than ideal. One person explained that with: "some reviews you can tell they have been done in 15 minutes – even for really good conferences". This is partially because of the short timeframes involved with conference reviewing: "When I am the chair of a conference and we are right on deadline and still missing reviews, I am doing them in about 20 minutes". Receiving poor quality reviews in Computer Science is not an isolated incident according to one interviewee:

> I had a [conference] paper rejected. I was so disappointed that the comments I got were so poor – I'm not sure they read it properly. It was one sentence. One score had no comments. … There has to be some justification [for rejection]. That one had nothing. I then resubmitted couple of months later to a journal.

Blinded peer review

Judging from the comments in the interviews, there appear to be few secrets in the world of academe. As discussed in the Researching section of this Chapter, sub-discipline communities are very small, so finite that the academic being reviewed can, and often does, make an educated guess at the reviewer's identity:

> There is only five to six at the top [of Sociology in Australia] to put it bluntly. And we would be refereeing each other's work endlessly. You can tell who has come in. You know their areas your know their style, you know their writing.

Certainly many of the interviewees indicated that guessing the reviewer's identity was easy. One obvious clue is when the reviewer insists the paper has missed key references that they have authored, as a sociologist described:

> [The reviewer] had a number of objections, I mainly hadn't mentioned one particular person and they sent me some references. I managed to find one of the references and decided that the person must be himself. I could tell from the style of writing.

Another difficulty with having such small communities is that researchers are likely to come across people who have personal disagreements with their research, as one sociologist described: "There is a whole politics of journal publishing. Sometimes it is a question of pot luck so a question of who in your peer group will review a paper and how sensitive they are about their position". This also means resending a paper to another journal does not mean you will have a fresh reviewer as one computer scientist explained:

> In the last year I had to resubmit a paper, there was an issue with the review. A paper went to the same reviewer twice and it argued against what she was saying. The style of comments means it was easy to pick up [who the reviewer was]. It went to different journals but ended up with the same reviewer.

This 'small pond' of people who are able to review work means that the reviewers are in competition with one another, which opens up other potential problems with peer review, such as stealing work as a computer scientist said:

> Once it is published its hard to steal something. What is more critical is how do you prevent loss and fraud situations in the review situation itself. If [a paper] goes across the desk of colleagues – who stops them from stealing ideas and saying it is unpublishable?

A difficulty with entrusting the body of knowledge to peer review is that peer review is not always objective. A couple of interviewees mentioned the difficulties they had had with putting ideas that were slightly left field into the peer review process. One computer scientist said:

> OK this is going to be slightly controversial. Within any community, cliques form around particular approaches or ideas. And if your idea doesn't fit into an existing clique, then you don't have people who will advocate your paper and go really hard and say this is really good, because there is nothing in that for them its of course their point of view or is part of their clique. So if something's a bit out of left field and doesn't come naturally, fit naturally in any of these cliques, you won't have any advocates for your work and so people would kind of be a bit iffy about your work because they would go, I don't know how to approach, I don't know how this one fits in.

Training the next generation

While peer review remains central to the scholarly communication system, there is very little formal training of what is expected of reviewers. Only one interviewee who was a sociologist mentioned the issue of training students to review (and what it means to be reviewed). S/he had organised a conference as part of the students' post graduate training. Prior to the conference, the students were informed of the style required for the papers, such as the fonts and layout. Then, "I organised two training meetings for potential reviewers and we went through the template – does title match content, does article have an abstract and a conclusion, and does this follow from the results". The students then anonymously reviewed each other and had to rewrite papers. This process extended over several months, and was run in two consecutive years. Between 20 and 40 papers came out in the booklets from each conference.

A couple of the Computer Science interviewees explained how they introduced their students into the process of refereeing. The conference system gives scope for this idea, as the senior academic on a program committee will often be given many papers in one block to review within a given timeframe. One interviewee described asking their students to do a 'pretend review' of papers, another gives reviews to students to give them an idea of what level of publication is expected at what level. While one interviewee said the students do well at this process because "they can imagine how painful it is to get negative feedback. Many reviewers don't remember how painful it is", another commented that "invariably students have a tougher attitude than I do. They have high standards".

Summary of peer review responses

Generally the interviewees appear to review in proportion to the amount they are publishing. Some of the chemists interviewed were prolific publishers. Chemistry papers, which are often short, and depending on the specialty, based around an image, are often reviewed by three people. Sociology papers are usually reviewed by two people, and the turn-around time can be very protracted. In the case of books and book chapters, it can be several years between the writing of the work and its subsequent publication. Computer Science tends to use conferences as a primary publishing medium. The review system for Computer Science conferences is comprehensive and inclusive, with papers in high-level conferences often reviewed by three people and then discussed at a meeting prior to being accepted. The turn-around for these reviews is within two months.

Most people indicated that refereeing is a professional expectation, and did not appear to begrudge the amount of time they spend on it, despite this time being substantial in some cases. Many indicated that refereeing offers a way of keeping up with the latest in the literature.

While there are differences between disciplines on this topic there are also big differences between individuals who may belong to sub-disciplinary groups. In addition, people who are later career researchers will often undertake a higher proportion of refereeing than those starting out. Regardless of the reasons, there are sometimes startling differences in the amount of refereeing being done by individuals within a discipline. For example, computer scientists split their refereeing time between reviewing a block of conference papers at a specific time and reviewing journal articles throughout the year.

In these interviews there was not a single instance of an academic being remunerated for their time spent reviewing journal or conference papers. The only payment mentioned by the interviewees was sociologists being offered books from the publisher's book list if they reviewed a book, and one chemist said s/he receives a free subscription to the paper journal s/he reviewed for. While it appears that there is an acceptance on behalf of the interviewees that refereeing work is unpaid, several people made the suggestion that some form of professional recognition by their institutions of this work would help.[11]

[11] While it is not the practice at either of the institutions from which interviewees were recruited, there are instances, both within a few Australian institutions and with some research councils world-wide, of a form of 'point' system allocated to on-time reviewers that can be accumulated with

In addition, there is a great deal of cynicism about the validity of peer reviewing for conference papers in Chemistry and Sociology. Several researchers mentioned the conflict of interest between making a profit with (or even simply covering the costs of) the conference, and rejecting potential attendees to the conference.

Peer review even offers some benefits to the reviewer. Positive comments given by the interviewees about undertaking peer review included the ability to have early access to papers that were in the reviewer's field. In several cases, researchers described using the papers sent to them as part of their attempts to keep up with the literature. However, often there is no institutional recognition of the work undertaken. This is partly due to the way refereeing is usually undertaken, where the reviewer's name is kept from the author of the work. This prevents professional or institutional recognition of the work being done. This is an issue because, as will be discussed, the only currency in academia is publication. Teaching is not highly valued in promotion applications, but at least there is evidence it has occurred. Peer review, on the other hand, is invisible work.

Those requesting the review – publishers, granting bodies and other institutions - are expecting the work to be done for little or no compensation, which may explain why journal editors are finding it increasingly difficult to find people to undertake peer review. In addition, the interviewees indicated peer review is not necessarily working the way it is intended to despite the time investment in the process. Despite these problems, the general consensus amongst the interviewees was that peer review is worthwhile, even though there are concerns about the time it takes and there are many examples of the system not working.

Summary

This chapter began with a discussion of the interview questions that related to searching for information. The three disciplines showed marked differences in the way they find what they need to conduct their research. It appears that researchers are managing the scholarly publication system, as it stands, well. The frustrations expressed by the interviewees tended to be within their community norms rather than towards the scholarly publication system itself. Overall the answers to the questions about copyright

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a monetary reward to the department concerned (UK Parliamentary Office of Science and Technology, 2002).

indicate that researchers are generally unconcerned by the copyright issue. Researchers spend a considerable amount of time in the refereeing process. This is an accepted part of the scholarly process and understood to be a contribution to their communities. However, the task is onerous for many people and there are limited ways to have that time recognised by the institution for which an academic works.

The next chapter will describe the responses to questions about how the researchers manage their careers and about the awareness and use of open access dissemination options.

Chapter 6 – Career results

Introduction

The previous chapter detailed the responses to the questions about the publishing, researching and peer review activities of the respondents. This chapter looks at the two issues of managing an academic career, and the respondent's attitudes and behaviours towards open access.

This section explores the way researchers manage their professional life in terms of the time they spend at work and the reward processes. Here, the examples given and the discussion generally does not distinguish between disciplines as the issues cross the boundaries. Where there are differences between the disciplines they are articulated. Beginning with background career information, the chapter describes the answers to the questions:

- *Firstly, please give me an indication of the split of your time between teaching, research and administration.*
- *Please briefly describe the research you are currently undertaking – what form does that research take (interviews, observation, experiments, computer work).*

Organisation of researchers' time

The standard academic position in Australia involves some teaching, some research and some administration with the time split described by the interviewees as variously "roughly a third each" or a "40/40/20 split". However, this is not always the practice, as one computer scientist explained: "It depends on my teaching load … I have a 40/40/20 break-up of time. I normally spend more than 40% teaching and 20% admin".

Some people described the teaching aspect of their role as onerous, for example one computer scientist has "a fairly heavy teaching load … I run a large third year class and year-long projects – projects with industry. It is time consuming", a colleague said, "I spend 70% [of my time] teaching, 30% research, I would like to get it to 50/50". Another interviewee from the same department said:

> In my case I teach a lot and do lots of research … At a peak I had more than nine PhD and more than 12 honours students. I teach two courses – one has more than 250 students, the other more than 400 students … I help with marking.

Taking on other roles also affects their research time. For example another computer scientist said: “I am Associate Dean of Research – I do a lot of admin for the faculty”. A sociologist said: “Before I became Head of School in 2005 I split my time 50% research, 50% teaching over the year”.

One Computer Science interviewee summed up the range of responsibilities of a teaching/researching academic succinctly:

> I keep up to date in areas, I read papers, talk to colleagues and supervise PhD students … When we have research outcomes we publish and write it up … It is very time consuming. Services to community – administration, like school meetings, advisory meetings and forms I have to sign. There are conferences I need to help organise. Plus journal editing and review papers for conferences and journal. Research is my greatest use of time – 50% [of time] 40% is teaching and 10% administration.

There is a definite split between session and non-session times in terms of the allocation of work and this is because the demands of teaching and administration are very immediate. A computer scientist explained: “When it is session I do no research … My split of work is 60% admin, 40% research. During term it is 70% administration, 40% teaching”. Another computer scientist said, “outside semester I spend most of my time on research – organising thoughts, catching up on reading”. One chemist said: “During summer [for] days or weeks, the majority of time I’m thinking about research or grants, thinking/doing research, and administration”. Another chemist stated that all of their ‘outcomes’, meaning book chapters and papers, were achieved out of session time.

Several people expressed a feeling of frustration about the amount of time they spent on teaching, for example one computer scientist said: “I try not to spend too much time in teaching. My time management skills need work. You need to do it right now, so I spend time on it”. A sociologist said: “I would love to have the time to do more [research]. Teaching takes up so much time. Time that I don’t feel bad about and enjoy but it prevents me from doing my research”. Another sociologist in their fourth year at the institution explained university policies were making the situation worse:

> …my teaching and admin loads became too heavy to do any research on entirely new projects … In universities a lot of people retire here and aren’t replaced so we all pull a heavier cart. … [The department] used to have 12 people, we now have six. Students have increased.

Even being in an ostensibly research-only position appears not to relieve an academic from teaching and administrative responsibilities. One computer scientist who had started an Australian Research Council (ARC) fellowship said: "I am 100% research. I still of course have some admin tasks and of course, PhD supervision and a little bit of voluntary teaching. But notionally 100% research". Another computer science in the Research School said that their position "used to be 'research only' but it doesn't mean you don't teach. I am primarily employed to do research and head a research group … Recently a lot of the job has been as a research manager rather than doing research. My time is spent managing". A chemist described a similar situation:

> Until 2002 I was research-only, a senior research fellow with the ARC. But I also taught first year and third year, a 25% loading of teaching. In addition I took on an administrative load on a committee, so I spent 10-20% of my time teaching and 10-20% on administration/committees. … The rest was on research.

Several people described a load that added up to more than 100% of their time. One sociologist described having completed a Bureau of Statistics work diary over six months, "they reckoned I was working 65 hours per week". Because of this pressure of time, many people work on weekends and out of university hours. A computer scientist described this as 'thinking time': "Some of my work is thinking in the shower, some is in front of the computer – getting going", but another computer scientist explained it was a greater time commitment: "I end up doing research at home or on the weekend". Not surprisingly, many people mentioned that this heavy workload was an issue. A computer scientist explained: "One problem with academic life, there is too much to do – you have to prioritise".

For researchers with commitments at home, the situation is even more acute. One sociologist said: "I am working around home [responsibilities] when I can or late at night, I do a lot of work until 2am, or if my partner has a day that is not heavy". A computer scientist stated: "I set up times so I can see students. My schedule is packed. I make an appointment to see my own children in my calendar[12]". Another sociologist described a period of particularly intense work:

> And at that stage I had three books back to back. I was writing one, proofing one and doing something with the third. That was just a nightmare. If you look back at that period that was every night of the week and every weekend

[12] This person was apologetic but serious when making this comment.

> working on publications. … I'd come back here to work at 9pm when the kids were asleep and work through until about 2am in that period. Whereas at the minute life's a lot quieter … the pressure is not as bad. But that would still involve most weekends writing or trying to write.

An exception to this problem appeared to be the few people I spoke to who are working for industry rather than purely in academia. This is purely an impression I received, and I did not push the issue but nonetheless, this could be an area of further work. One person explained: "I interact with industry more than most sociologists. I am seeking to influence industry. Writing more for practitioners than academics. I am seeking people who directly want to apply the ideas".

There are implications of having a large workload on the way research is conducted. In Chemistry the demands of administration and teaching mean that senior chemists don't actually perform the experimental work, this is outsourced to students. One expalined: "I haven't been in the lab full time for 20 years. I depend on co-workers to carry out experimental work. PhD and postdocs and the odd honours students". Generally the senior chemists interviewed did not do laboratory work, with a couple of exceptions: "In my case I start in the lab and migrate to the desk. I still try to get into the lab and do experiments. Most colleagues don't get a chance to do that through the demands of bureaucracy and administration". One senior chemist described how their work was now mainly document based:

> Well I don't do any experimental work myself, even though the area of work I am in is experimentally based. So all of the work that is done that is published is done through the hands of postdocs, PhD students and honours students to a lesser extent … we talk about the research and plan the research together … and those students or postdocs will go back into the lab and try to modify experiments … But I am intimately involved in interpreting the data that the students and postdocs are generating in the course of their laboratory activity and I write grant proposals, I write up the manuscripts and look at drafts of PhD theses and make fairly detailed comments on those as the students develop their theses. So those are the sorts of activities I'm involved in. I sometimes jokingly call myself a Microsoft Word chemist because I guess I spend as much time manipulating draft proposals and manuscripts as anything else.

Collaborators

As discussed in the Researching section of the previous chapter, academic communities are very small, with the numbers of people working in an immediate field running into the tens rather than hundreds. Researchers often work with groups of people, and these can be in the same department, or overseas. One computer scientist described their collaborators as: "further away. My interests are unique in [this university]. I have Melbourne and Sydney and overseas collaborations – USA, Canada, Belgium, Germany, UK, Japan". Several computer scientists described their PhD students as collaborators: "I have two PhD students. Aside from them all my collaborators are in the US. I have one in the UK. Occasionally I work with people in other countries as well. Mostly, almost exclusively my collaborators are in the US".

Chemists also described collaborating with people outside their discipline, and sometimes for reasons other than research: "I often go away to do stuff. I go to different universities – Belfast, Melbourne, Canberra. Doing this means I am near people with different skill sets, and gets away from the distractions – administration takes time". Another example from a University of New South Wales (UNSW) chemist was:

> I collaborate with other UNSW staff and people in other places in Australia and overseas. My role is thinking about the background behind the experiment and doing the interpreting … Earlier this year a Swedish bloke working in the labs made some compounds and took them back. His supervisor and I will keep the collaboration going. Usually communication is by email and telephone. We meet occasionally at conferences and have a beer.

Amongst these interviewees the exception was two computer scientists who mentioned working mainly with local collaborators. One said: "All my publications are authored by two to three people, I am mostly working with people close by". Both of these people were involved in 'real-world' applications of their research: "I am collaborating with a CSIRO PhD student who is co-supervised. I am hoping for collaboration with CSIRO and in the longer term with the Department of Defence".

Reward processes

The chapter will now look at grants and promotions, and detail the answers to the questions:

- *Why do you publish?*

- *What is your understanding of the relationship between your publication output and funding?*
- *Do you have an opinion about any changes to reporting requirements by your university/the government?*

The grant issue

Obtaining grants was repeatedly given in answer to the question: 'Why do you publish?' particularly amongst the chemists, and some of the computer scientists. Typical answers from chemists included, "What drives me to publish is requirements for getting grants" and, "of course if you don't publish you perish in the granting system, so that's rather critical", and another comment: "[publication] is certainly a major consideration in the first part of a career. It is related to raising grants". Other people also mentioned the importance of a high rate of publishing to obtain grants. One estimated: "You need a minimum of 30 papers in the last five years", with another said, "I am guessing that most successful grant receivers average about six papers a year". As another chemist said, "Everything stems from ARC grants – they expect you to publish in the best forum you can". In addition, one computer scientist pointed out, "All promotion is tied to the publications you have".

Certainly the concept of 'publish or perish' is still very relevant. As one computer scientist expressed it: "There is still pressure to publish to get ahead". Without publication, others said, you lose any chances of having a successful career: "if you don't [publish] you die". One sociologist argued that publication keeps people "geographically and socially mobile" which is important because: "… we live in perilous times in academic life and if your publication is not up to date you are in trouble … So if you want a chair in Sydney or Melbourne you have got to have it".

Some people said these pressures mean people publish for a "track record to get grants", and more than they would ordinarily choose to. One computer scientist said: "I would publish less if it was not the case or would wait to publish in a bigger paper … Promotion is tied to your track record. Grant success is tied to it". A chemist said:

> We tend to salami slice our publications because of the assessment problem. We are tending to publish thinner papers than we would if we published at our leisure … I would still publish, but in a way that would be more beneficial to the community, only one paper with everything.

A sense of frustration with the process of obtaining grants, and fulfilling the requirements of these grants was a common theme in the interviews. A sociologist stated: "Grants are about getting another totally useless publication out". One of the chemists had a similar perspective: "I'm not a person for publishing everything. I think there is too much emphasis with grants needing publishing and without grants you can't do the research". Another sociologist was describing how challenging the grant process work was for their type of work: "My research is textual – not interviews, but I will be interviewing people because of the demands of [the ARC grant]. How can you fit a model alien to the actual needs of your research?"

The time required to apply for grants is causing some frustration in the Chemistry community interviewed because it takes precious time away from research. One argued that this was not a productive use of their time: "Increasingly I am stuck in front of the computer writing papers, grants, grants, grants … To pay bills, I spend three months a year to write grants to pay people to do the work". Another chemist commented that publishing is a means to an end rather than a way to further knowledge:

> … with grants you need publishing and without grants you can't do the research. There is too much emphasis on how many papers and they don't look at the quality or if things furthered the area of research. Publication output and funding have a direct correlation. Without publication there is no funding.

The researchers interviewed did not object to publishing their work, indeed most indicated that unless it was published, it effectively had not occurred, but they did say they are being forced to publish in ways that are not natural to the work they are doing, nor to the communication system they have established with their peers. For example one sociologist said: "I'm much more interested in writing books … I have to write articles too – it's the way you get ahead. To me it's a waste of time. The average article is read by very few people". Another sociologist said they publish "to avoid perishing" and said there was a need to publish in international journals because their books were all Australian: "in order to demonstrate you are internationally known an academic needs to publish in international publications. I am doing it for my academic career, I don't find much international pay off". They described this as a "cultural cringe".

As discussed in the Publishing section of the previous Chapter, there is an added time management challenge for computer scientists because the conference season overseas is at a set time which means that researchers who wish to prepare papers for submission to the conferences are in a period of writing up papers and reviewing papers in the

beginning of the Australian first semester. The deadline for ARC grant applications also falls at the same time.

Promotions committees

In Australia researchers seeking promotion must apply to an institutional promotions committee with evidence of their academic output. This was another very common reason people interviewed gave for their work, with a computer scientist stating, "I publish for career", and a sociologist saying, "there is pressure if you don't publish … you are expected to publish". Several computer scientists commented on the topic of publishing. One said it "is important career wise when promotion committees look at you". Another said publishing "is required … It is mainly to retain my job, we are mainly promoted based on communication", and another said: "I try to publish because it is important to have as many papers as possible for your career". Publishing alone is not enough, there are still loops to go through for the reporting of these publications, as one Chemist explained: "The reporting requirement is tedious – every paper you go through loops to prove you published it, with a letter from the editor to say it is refereed. It's unnecessary, if it's in the journal, that shows it's refereed".

This pressure to publish can be problematical, explained some of the sociologists and early career researchers in Computer Science, particularly women, because the demands of their teaching load means research is not being undertaken at all. This has implications for their future career promotion advancements because publication output is a prevalent method of assessment as one computer scientist explained: "All the evaluation of research, peers and employer is looking at publications. It is the measure used to judge research work". A chemist expressed the lack of faith in the promotions system: "I don't believe impact factor is a reflection of the quality of the journal … Many low impact journals have high quality science. [But] because of the way performance is assessed we have to play games".

Another difficulty with the promotions system in Australia is the promotions committees which consist of a mixture of disciplines, usually, "a panel with no more than one scientist in your area", explained a chemist. Some of the interviewees in all disciplines explained that the difficulty with having a promotion committee consisting of people who are outside of the discipline of the person being assessed is generally there is little understanding within academic communities of how other disciplines work. Even within a discipline such as Computer Science, there are disparities in expected behaviours. One interviewee who described their work as being in the "Mathematics end of Computer

Science" noted that: "In most Computer Science disciplines, publishing in conferences is the key way to get information out. In Maths you go to conferences as much but you don't publish work in conferences, the priority is to send work first to journals". Another computer scientist said: "Engineering School promotions committees have no idea about the quality of journals". This Computer Science/Engineering divide was highlighted by another computer scientist:

> The problem is the promotion committee may not be from my field … Typically there is one Computer Science person on the promotion committee. Then another from Engineering. The difficulty is when both compare – they have to take computer scientist's word for it. They have to convince the other people.

The situation is more acute when a committee member is from a completely different field. This creates the potential that they will impose their own disciplinary experiences when judging other people's work. For example, an interviewee who had worked in Philosophy had previously only "published in journals and had given talks at conferences", but when s/he changed to working in artificial intelligence noted, "the publication patterns are very different". A few chemists interviewed appeared not to understand that conferences in some disciplines are highly competitive. One Chemistry interviewee argued that the people doing the refereeing for a conference may be the people who organised it, and so they have a need to put in papers that may not be up to standard. While this may be the case in Chemistry, and was a situation described by a couple of sociologists in these interviews, it is not how Computer Science conferences are organised. Another example was an interviewee who had moved to Computer Science from Chemistry mid-career, and had been confronted with these differences:

> It's different, in Chemistry it is heavily oriented towards formal publication … In Computer Science the majority of publications are conference proceedings. I came to that community somewhat sceptical of conference publications. Now I'm not quite so sceptical.

When a researcher's work straddles two disciplines it can become very complicated, as one computer scientist who does work on biological systems explained:

> In Biology we have the need to publish in journals, in more experimental workshops. Conferences have higher prestige but you have to publish in journals still. You must find the mixture which gives the response from the publishing community and opportunities to the right people.

To give an example of this lack of understanding between disciplines, one Sociology interviewee mentioned that all of the staff members in the department had been asked by their Deputy Vice Chancellor (who has a Chemistry background) to identify the top four journals in their field, which the interviewee described as 'a nonsense' in the area of Sociology and that: "Internally within the department we are doing deals with each other. There will be no congruence, they probably won't find any repeats". Another sociologist expressed despair:

> I am so frustrated with the situation at the moment. The bureaucrats don't listen. The department people simply micromanage the requests [for publication]. It's like Britain, they have to change [the Research Assessment Exercise] because everyone has worked around it. There is an inability to listen to their better scholars. How do I survive this?

Many people complained about promotions committees. One problem the interviewees had was the emphasis on the number of publications over any quality assessment. One sociologist said: "Promotions committees shouldn't weigh publications, they should look for articles that are genuinely new". This comment about 'weighing' referred to the idea of putting a person's publications on a scale and awarding promotions to the person whose pile was the heaviest. A chemist conferred, saying there was "no appreciation of content, they just look at the numbers. I am cynical, with a 20% success rate they must cull applications somehow". The promotions system means that "altogether too much is published" said another sociologist who described a situation where "every field is swamped – a lot [of publication] is useless except for furthering careers … It will have to get a whole lot worse before the system collapses because it will".

It is not just internal promotions committees who push the researchers to publish more and more, it seems. One sociologist who was interviewed for a chair at a different institution was confronted with very high expectations:

> notwithstanding the seven books and 40 articles and chapters and Christ knows how many seminars and conferences the first question was "why has your article production slowed down?" And I said, look I have just written three books and he said "yes we understand that but your international profile has got to be stronger, you have got to"… far out! How much work can you do?

The person interviewing came from a Psychology background, which to an outside observer, should be reasonably similar in terms of publications and community norms to Sociology. However, this is far from the truth, as my interviewee explained:

> There is a great deal of professional boundary stamping around Psychology and Sociology … he would be a behaviourist and he would be a positivist so he would only think that things that were data driven and internationally published count.

While this situation may seem extreme, the impression that emerges from these interviews is that this counterproductive method of judging work is the cause of great frustration and disquiet in the academic community.

Promotions committees and Computer Science

Because of the way promotions are assessed in Computer Science, interviewees said they publish in journals as well as conference papers but more for archival purposes than to communicate findings. The difficulty is that within the community the standards are different explained one computer scientist: "It's the way your work is perceived. If you are published at conferences it carries a lot more weight". This is different from other disciplines, said another: "In the Chemistry field you are driven to publish in journals. You won't get grants unless you have a raft of publications … There is a balance between getting published in the literature and publishing your work in higher quality conferences". The administrators at the institutions where I conducted my interviews are requesting the researchers to increase their journal publication, which is causing disquiet in the Computer Science community. For example one said: "I get the impression the uni wants to push academics to publish in journals … The computer scientists use conferences".

This creates a conflict between how the researchers wish to interact with their international community, and their need to fulfil their work obligations. One described the problem with conferences: "We typically don't go for national conferences … for quality reasons, we want to be internationally known. We get criticised for not supporting national conferences". This requirement to support national conferences was mentioned by another interviewee:

> To retain international reputation you need to be seen to publish in top conferences. That is not necessarily what you want for promotion purposes. Non-Go8 publications are purely national conferences. The game is to get as many as possible. I think it is common everywhere … It doesn't affect where I publish. The international reputation is more important than the local reputation.

This situation of having to publish in places against community norms was in response to direct statements by promotion committee members. One interviewee explained: "My promotion committee feedback is you should try more journal publication". This person was another cross-disciplinary researcher:

> [They said] try to have more of a mix with journal papers – broader range of papers. Last year I published mainly in conferences that were local. In the last three years I have published mainly in Australian conferences – they commented I should try top international conferences as well as journals to get more of a mix … They want me to put more in core computer science journals. I'm not sure how highly regarded BioMed Science journals are. They are not computer science journals so it's not as highly regarded.

One computer scientist mentioned there are differences between publishers in terms of the time it takes to have a paper published, but: "it's a political play. If you are playing career oriented as possible, you must go to the most regarded publication, which means out of date publications". Some researchers play the 'game' at different times in their career:

> There has been a shift in my attitude. I am now at the stage where the next promotion is to professor. I am more discerning about where I publish because of the promotion process. I need to do groundwork to convince a broad committee.

A couple of interviewees described tentative indications that the promotions committees and the ARC were finally beginning to understand this conflict in Computer Science: "During my renewal last year for the ARC, they asked if conference papers were more important than journals. They have worked out the difference". An attempt to address this situation has been an Australian ranking of conferences (CORE Rankings Subcommittee, 2007), and it would seem that this will help the situation. As one interviewee said:

> In Computer Science … there is less of a distinction between conferences and the journals. There is a distinction between refereed conferences and non-refereed … There have only just been recent efforts to rank [conferences]. That will have an impact.

Inevitably, there was some disquiet about the ranking decisions. One person who is in software engineering commented:

> We have just been hit with league table of conferences and journals. If you look at tier 1 – software engineering is in tier 2 and 3. This will distort the work I am going to do – Tier 1 is all artificial intelligence stuff.

Summary of reward process responses

The researchers interviewed are generally very busy, with most indicating they worked greater than a full time load. Almost without exception the bulk of their research and publication occurs out of teaching periods. A considerable drain on academic time is the necessity to apply for grants and the need to have a high publication rate to be successful in grant applications.

The largest issue within the reward system however, is the need to publish in forms that satisfy promotions committees which often consist of researchers outside their field. This means there is a need to meet the publishing expectations of other disciplines, by publishing in international journals and some researchers are being forced to publish against their disciplinary norms. This was not as much of an issue for the chemists, but the sociologists indicated there was little 'value' given to book publication despite the higher proportional amount of work it takes to author and publish a book. The computer scientists are most affected by this situation, being expected to publish in journals despite this not being the way they communicate.

The master/apprentice system in academia

The chapter now explores the master/apprentice system of training researchers. In this section the findings are split into disciplines. The area was explored with the questions:

- *Please describe any formal instruction you were given about the publishing process. (If there was none, please describe how you found out what you know)*
- *Are you involved in any formal or informal mentoring or training process for young researchers to 'show them the publishing ropes'?*

It should be noted that of all the responses in this research, the experiences described here of the interviewee's time as a student have the least inference for their home institution. The interviewees ranged from early to very late career researchers, so these experiences occurred all over the world, in a period ranging from the 1960s to as recently as a few years ago.

A general observation about the responses received on this topic is that Australia appears to be worse at the master/apprentice system than the US. One computer scientist said:

> … in the US, because of the way the tenure process works particularly, there is enormous pressure to publish and publish at quality venues. There is a much stronger sense of quality venues are and where impact lies and people are

> much more driven towards getting those publications out the door. It is very intense, much more so than here. So people play the game very thoughtfully.

A sociologist described the different culture in the US: "I compare myself to colleagues in US universities where they are typically rewarded with every publication, each one is an increase in salary". This relationship between publication and money was noted by another computer scientist:

> The reward process in Australia is not as straightforward or proportional as the US system. Here if you have lots of publications you can apply for money from the government. The amount you get is not enough to go to conferences. You need to produce a lot to get a small amount of money, not enough to get throughput. You need to collaborate to sustain publication. Now I seldom publish alone – we team up funding – this affects the direction of research. I don't need any other collaboration, I need money to go to conferences. With 12-13 publications [in a year] I can go to half to two thirds of them.

Formal training offered by universities

The Computer Science department at UNSW offers a formal training course[13] to PhD students in research techniques which includes writing papers. While this appears to be a step in the right direction, one interviewee had attended the course and not found it helpful:

> It teaches students how to present, write and read. I did the course myself but I didn't find it useful. They would give pages from a book about writing academically. It wasn't practical enough. When I did it there were 20 students and one teacher. There was nothing about impact factor and citation.

One interviewee suggested a problem with the course might be when it is given to the students: "the Research Methods course is done too early, they aren't into their topic enough yet to benefit from it".

The Australian National University (ANU) also runs short courses about academic writing and publishing through its Academic Skills and Learning Centre[xli]. Not one of the people interviewed at ANU (in any discipline) mentioned this service, which could mean that they are either unaware of it, don't consider it to be of value, or did not connect that what we were discussing is the sort of training the Centre offers. One Computer Science

[13] Course 9910: Management and Communication Skills for Research in CSE

interviewee suggests Centre for Academic Development and Educational Methods (CEDAM)[xlii] courses to students. CEDAM offers courses to supervisors, but not courses to students about their research process.

Learning the ropes, Chemistry

As discussed in Chapter 4, of the three disciplines explored in this work, Chemistry is the discipline that best fits the description of a 'hard science', and the apprenticeship system is still entrenched in this discipline:

> I don't see they are fully fledged until they have finished the remainder of their apprenticeship. Even when they get to the point of a more senior fellowship in my game you need quite a few pairs of hands. A straightforward idea might take six months to test and bring to some form of success. They need to establish a small group to do anything.

One result of this system is the interviewees did not necessarily receive any instruction about how to publish because their supervisors had done all the work for them. As one Chemist described: "When I was a PhD student my supervisor would write the papers, let me have a look at them and we would argue the toss about various things but he did all the writing". This was not uncommon as another explained: "My PhD supervisor was possibly the most prolific publisher in the world. He used to write them all himself. I wrote most papers after my PhD was finished. My post doc supervisor I worked most with". Others had had more help from their post-doc supervisors, with one saying: "the postdoc is driven by supervisors. I think you learn on the job, I wrote early papers, with my supervisor doing it jointly. Some supervisors want to be the first author". Another said:

> … when I was a PhD my supervisor had a policy of writing papers. Writing from scratch as a postdoctoral fellow, I copied my supervisor's style. No training in writing. It has never been a problem. I know what referees expect. It's not hard to work out. Overall my rejection rate hasn't changed … My experience was I'll produce a rough draft and my supervisor gave me a finished draft.

One chemist described informal training, where their 'superb' PhD and post-doc supervisors had explained "the way they were thinking of how to make a paper exciting and how to choose a journal". This researcher would, "give them the manuscript and they would come back with more red than black. It taught me by the seat of my pants of learning how to write a good paper". Another researcher said they had experienced: "much discussion where the article was going and why. At the time I was not sure if I understood, but it was there." Including the chemistry student in discussions about where

a paper would be sent was another effective way of instructing students in the system described by interviewees.

Other interviewees indicated that they had not had any specific discussion about the relative worth of journals, but the chemists appeared to be far less concerned about this than the computer scientists. One said: "With journals affecting career I was given no information about it. People in Chemistry might obtain information subliminally. I can't recall a time when I didn't know journals' relative worth". Another explained: "I was not taught [where to send a paper] in particular, you learn how work is valued". Yet another also indicated a lack of concern:

> I don't think anyone has ever told me about publishing. The way I learnt most about publishing is reading other's papers – by osmosis. It is obvious what's involved when writing, you get info for authors – first or last issue on how to write paper eg: how many pages it's got etc.

Guiding others, Chemistry

One result of the apprentice system in Chemistry is that often the students do not actually write papers. As one chemist explained: "On one three year project it is normal not to write any papers till the end or close to the end. Very few [students] have been able to write a coherent paper. Four or five produced a pretty good draft". It may be many years and students may have several papers on which they are listed as an author before they actually undertake the writing of a paper.

While PhDs might write some of the paper, sometimes the supervisor finds it easier if they do the work, "the quite tricky part of paper – journals are quite picky about. It speeds up the process if we get it right at start [so I do it]". Another interviewee said of PhD students: "They write the thesis I write the paper … In post doc they are writing under supervision, they still draft". One described that they were, "writing up student's work and publishing it". This gives the students, "standing and research funding … The real barrier is getting students to write a paper. But they need to do it and need to be writing a thesis at the end. I talk to them about it all the time".

There appears to be a split in the attitude of the chemists about whether their role is to teach students to write or not. Some interviewees spend time instructing their students including the technique of bringing papers to meetings for discussions:

> My instruction to others mirrors my own experience – except no-one I worked with had a strict regime of bringing papers to research meetings. I hope they

> learn how to write papers as well. I am a bit more structured about it. When they write a paper, I sit down with them "this is how I approach it". Advise them how to do it. Figure first, structure of the introduction. I give them a structure to work from.

Many lecturers and supervisors are helping students by redrafting their work. One explained: "If my students produce a draft I'll cover it in red ink. I expect them to write their own papers. We go through a series of revisions… I think my students should learn to write". Another said they ask their students to draft papers that they rework: "The difficult part of paper for students is the introduction and the conclusion. I go through with a red pencil – I limit that when it becomes better to redraft. I give it back for comments".

Other interviewees said they used the writing of papers with their students as a teaching method that helped organise thoughts and provided fodder for the student's thesis: "The way I supervise is I try to get students to write papers. They should have 3-4 papers … it is what the PhD is about". The papers produced in this process can be used in the PhD:

> I say to my students there is a real rigour that comes with writing articles for journals and if we do that writing ahead of the production of their thesis, that essentially the article could become the backbones of a particular chapter in the thesis. It also forces both of us, myself and the student, to think deeply about the research … I find it a very important process for all sorts of reasons.

Some Chemistry interviewees did not spend any time instructing their students on how to write, preferring to write the papers themselves. One explained: "The efficient way is for the CI [chief investigator] to do it. It is a sort of osmosis for students, they see what is involved". Another chemist said that the students do the bench work for projects they had designed and obtained funding for. The chemist then takes: "prime responsibility for communicating results of work … I write the introduction, discussion and conclusion. I submit and deal with the referee's comments". Taking all responsibility for publications, even those generated from the PhD student's research, was described as a matter of convenience by several Chemistry interviewees: "On the whole it is easier for me to write paper from scratch".

When describing helping students learn the craft of publication, the issue of determining where to send papers was not discussed as much, only a few chemists mentioned it. One was very vague, saying: "We have probably talked about where it needs to be sent". This could possibly be because unlike some other disciplines, the journals in Chemistry are

very well defined. One chemist said: "If students are writing a paper we discuss possible places for publication. In some cases we do make decisions in advance of writing – where we'd like to aim for".

Learning the ropes, Sociology

The Sociology interviewees indicated there had been very little mentoring from their supervisors. One said: "No I didn't get a leg up from my PhD supervisor, it was pretty much this is the bird-bath, now you learn to swim". Another said: "I don't think my supervisors ever assisted. They probably said you need to turn it into articles but they didn't show me". This lack of mentoring has resulted in at least some sociologists having a slow start to their careers, as one said:

> It took me years to find out the conference papers didn't count. I was producing about 10 papers a year, initially to groups like Aborigines. Professor [name] wrote a book – cited me as an unpublished paper. I never had any mentoring … I only just realised in the last week that editing doesn't count for DEST[14].

This person sought assistance to find out about the publishing process (a decade after embarking on their career), which was clear and unequivocal once requested.

One early career interviewee was still unclear about the issue of making strategic choices about publications: "Impact factors – I have not heard of them. I know there are scorings of access of journals. Another recent bit of advice was to get the administrator to give you a rating of social science journals". Despite the lack of direct instruction, some sociologists had had encouragement from supervisors. One said: "With thesis publication there was encouragement in the school. I sent off proposals to publishers. The first publisher I approached was Oxford – they ended up dropping it but the editorial advice was good".

In the absence of instruction from their supervisors, many interviewees had looked elsewhere for advice. Some people described friends helping them. For example: "I got involved with [name] who was more into publishing … He and I published a few things together … But it took a while". Another said they had spoken; "to a friend about a paper. She said send it somewhere worthwhile. She gave me advice about whether to send to a reputable journal and risk being knocked back or less reputable and get published". Sometimes their friends took the role of mentor, for example:

> When I was starting out I had a friend a couple of years ahead of me, who was doing his PhD. He used to keep on his desk a copy of Ulrich's. And Ulrich's is the

[14] The Department of Science Education and Training.

> international classification of journals by subject and title. And [name] was a spectacular publisher. Spectacular. And what he did, everything he wrote he went through Ulrich's until he found someone who would publish it.

In other cases, the review process from the journal or publisher provided the feedback needed to write more effectively. Indeed, for one interviewee, "My first publication was encouraged by the editor of a journal". Others have relied on the comments in the reviews:

> My first review had some suggestions to what [I was] saying I so wrote back asking him to be a co-author. We incorporated stuff and put him in as secondary author. … It was a good experience, he was a very generous man. It must have taken time. … It doesn't happen any more - people don't have time to be generous.

The value of being rejected was described by a couple of interviewees as a way to find out what was and was not acceptable for publication. One interviewee described being: "very lucky, my first three or four articles were accepted immediately. Then I got rejections. That's when I started to think more strategically. I talked to colleagues".

One sociologist who had had no instruction for "the jump from PhD to publishable paper" said they: "learnt by sending stuff off. Papers were accepted with really major changes and I worked it out. Probably one big mistake was silly decisions about where to send things". They were not the only interviewee who described being over-ambitious about where to send things, with another saying:

> I went for *Science and Social Medicine* which is the biggest international, and got roundly beaten up, very roundly beaten up. Which teaches you an awful lot about what you can get away with saying and not saying at that level.

Only one sociologist described being given specific advice:

> The advice I was given when I was a young scholar was publish anywhere, anytime and start leaving it off the CV as you get more mature and highlight only the good internationals. And I think that is probably generically true. I don't know how many people start leaving things off but I certainly do. I have things published that were run off on Romero presses that you wouldn't want to own up to any more.

Guiding others, Sociology

Encouraging publication in Sociology is complicated by the emphasis on publishing monographs as well as papers. Part of the difficulty is the nature of the research:

> In the social sciences it makes it difficult to hive off part of the work and get it published. It is easier to do in the physical sciences and be co-authors on paper. It is an issue that should be addressed.

That said, the people interviewed seemed to be encouraging their own students. One explained: "If I think [a student's] work is publishable I put in a lot of energy. I talk to them about which part is publishable … what the reader would be interested in. I advise where to publish". A couple of individuals I spoke to in Sociology had undertaken to teach their students 'the ropes'. For example a peer review training program was described in the section on Peer Review in the last chapter. Another Sociology interviewee mentioned a course they had developed: "I encourage others to publish, I can help people to publish. I ran a publications series for students once until I ran out of money".

The sociology interviewees recognised that publishing helps the student's career:

> I like to see my PhD students get two journal articles out of the thesis while they go. Because once it's in the acknowledgements in the front of the thesis it gives the thesis a phenomenal legitimacy in the eyes of examiner … So you give them a lot of moral support but you can't actually make them write it. And you tell them strategically this is a good thing to do.

However, writing papers takes a back seat in some cases: "I would like to give my PhDs instruction, but typically the main concern for all of us in Sociology is getting the PhD done".

Learning the ropes, Computer Science

Many of the computer science interviewees described having to work out how to write a paper and where to send it on their own. One computer scientist was given no explanation of the publishing process, s/he: "worked it out on the go. I read papers and wrote my papers in similar format … [I became aware of the] impact factor through going to conferences. Some journals have trade booths to advertise their impact factor". Another computer scientist described a trial and error method, having spent "five to six years to work out how to get into a high level conference, the way experiments were done and the way to write them". Another described a lack of assistance even with their PhD writing: "A PhD, what was expected of these things? I was not sure if what I had in front of me was PhD. I have firmed up my views now – formed my own opinions of where the value is". At

least one person did not appear to find the lack of instruction problematic: “I had no instruction … I learned from co-authors and peers, it was evident what the structure of a decent paper is, and presenting an argument”.

Those interviewees who were trained overseas generally had had little instruction on how to write papers. One who studied in Germany, said there was “nearly no guidance”, and they had had to solve these problems on their own, but “this was fairly common there”. Another German speaker did their PhD in Switzerland and “had to write in English with a German speaker’s background. There was no support on where to submit papers”.

There were some examples of good, systematic training, or at the least encouragement. Some described instances when they were a student, they were asked to write a draft that was then corrected by their supervisor. For example: “I had no formal instruction on how to write a paper. My supervisor recommended the time to write up. I would draft and he would demolish it”. Another described the one-on-one training with their PhD supervisor: “They put emphasis on writing, these are important skills as a researcher. My first paper I had 25 versions of same stuff. It was good because once it’s done it gets easier”. Another described a similar experience:

> I learnt through the PhD study process … you have to be well trained. It is more like a mentoring process. I was asked to read a lot, asked to review and criticise, asked then to draft one – try and mimic and see what happens. The printed copy was returned full of red ink, learn from them. It was a painful process to learn but eventually good.

This person also had a supervisor who encouraged them to submit work:

> The decision about where to send work was mostly affected by my supervisor. If they encourage you to submit to high quality conferences by the time you graduate, you have published in high quality conferences … Which university you attend determines how good your training is.

In one instance in Computer Science, the mentoring process for writing has continued well into the researcher’s career. The mentor who worked on the interviewee’s writing when they were an honours student, is still doing so: “I wrote a paper and gave it to my mentor, he totally rewrote the paper. To a lesser extent that happens today, the same mentor”.

Another method of training was for the supervisor to write the more complex part of the papers for the student: “Early stage PhDs contribute to the technical part, the supervisor

writes the background and introduction". This person described they were mentored about where to send material: "usually my advisor would suggest a conference to submit to … I got to know the key people and key scientists".

Some people described a situation where they 'picked up' the information they needed. One said they had done this by: "being in a research group with other students" who "always had the luxury of supervisor's reading our work". For this person, there was no confusion about where to send work: "It is obvious - it is clear what are the top conferences and journals. At the time we were all aiming at these conferences. Our supervisor encouraged us to aim high". Another person described their early experiences as "informal discussions with my supervisor … I never received any formal training, I wouldn't know where to go for it. A lot of people know [about publishing] but it's not written down".

In some instances there was a distinction between the mentoring of the writing, and instruction about impact factors and other issues, where the individual had been given help with their writing but not with the importance of where to send your work. That said, some interviewees had been given direct assistance: "I was taken aside by a professor of logic who advised me that this is the way academia works. Sometimes it's the number that counts". One interviewee who as a post-doc had been told about how the publishing system works said:

> When I was writing my CV for grant applications I was told 'you had better tell them how many times you are cited'. Publication record is extremely important. I had an email from the Associate Dean of Faculty on the 'do's and don'ts in grant application'. It was my first advice on track record and a huge factor in getting a grant.

One interviewee had a PhD advisor who they said "wasn't in the game". This researcher found out how the system worked during their post-doc at another university:

> after my post-doc or during my post doc I started getting invited onto [conference committees] and I'm now actually on a lot of those committees and that gives me an insight into how a lot of those decisions are made, so it makes it a lot easier to get my pitch right. So I think that is really crucial, the thing I totally lacked in the first five years of my career and I was totally shooting, stabbing in the dark.

In other situations it was more of a trial and error scenario. One interviewee who had had no mentoring at their post-doc university in the UK, "found out the hard way". They described the biggest challenge "was to change my attitudes towards publishing from a very pure attitude. I only wanted to publish in the best journals or not at all. Slowly I changed to it was OK to publish in lesser journals".

Guiding others, Computer Science

For many of the interviewees, their own introduction to the publication process was poor enough to encourage them to be more proactive with their own students. One described their own 'learn on the go' experience as being effective but taking too much time because: "The government now expects students to do PhDs in less time". Another said: "I hope the next generation will do better. Half of the work [writing papers] is done by the students, I try to help and mentor them as co-author". In at least one case, the lecturer did not know if it was their role to be mentoring: "With my own students – I tend to be similar to my supervisor. I'm not sure if it's my responsibility to train them to write. I comment on the correct style of writing". Another interviewee metaphorically threw their hands in the air: "Am I instructing students in publishing? – probably not enough. It is something they have difficulty with. Students and postdocs have trouble writing papers and structuring papers".

The type of assistance the interviewees are offering students includes helping them with early drafts of papers and choosing conferences. One approach is to choose a conference and work towards a publication in that. Several computer scientists described this method, with one explaining: "We plan to write up work for a journal or a conference. I will give advice about which conference or journal will be likely. I suggest they try something out locally first". Another said: "We discuss conferences coming up and plan ahead with internal deadlines – draft – discuss lots of proof readings – point to deficiencies. I encourage them to read lots of papers". One described an iterative process:

> I often choose a conference in a few months time, so students can set a target. The students will write the first draft. If they are at the beginning then I give them advice and change things but by the end they can change it themselves.

Another technique is to work through drafts prepared by the students to help their writing: "I spend quite a bit of time reading through student's drafts commenting on the language and discussing where to send it. I encourage them to publish … We do citation counts together". Another tries to write a joint paper with students in their first year: "I correct [their draft] and they fix it. I act as a reviewer. Whenever I make a correction I

make a note of why. I can usually convince a student why it is a particular way". One specifically mentioned: "the apprenticeship model, [PhD students] need to learn the craft which includes writing, so although it is never as efficient as doing it yourself, the student has to do it all, bring stuff back, get corrected and it goes round and round in circles".

One computer science interviewee described giving 'explicit instruction' about how to structure the paper. Another said: "I give students instruction. By the time they finish they can write a paper that would get into a top conference. This is done one to one – editing and chopping". One described the technique to help students of giving them some relevant reading material, such as Phillips and Pugh's (2005) book, *How to get a PhD*, and encouraging them to start writing papers: "The broad idea of trying to get papers, a string of papers done during the first two thirds of the PhD as the foundation of the write up stage I have found I encourage my students to do, with mixed success".

Summary of master/apprentice

There are two possible areas of instruction for publication, how to write a paper and where to submit the work. The experiences of the interviewees of how they learned these processes were vastly different and the quality of this instruction appear to depend heavily on the supervisor an individual has. There are also disciplinary differences. In Chemistry, for example, it is common for a student to have several papers on which their name appears as an author but not to have contributed anything to the writing of the paper. The opposite can occur in Sociology, where the supervisor will not co-author papers with students to avoid the risk of influencing their work.

Many interviewees described having no instruction, and having to 'work it out' for themselves by submitting to journals and receiving scathing reviews. Generally in all three disciplines when there actually is some mentoring on this issue, the method of training involves the student writing a draft which is critiqued by the supervisor, and these drafts are refined until the paper is ready for submission.

Awareness of, attitudes to and engagement with open access

This research project is asking: "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?" In the interviews undertaken for this research, the questions about open access and repositories were kept until the end of the conversation. Part of the reason for this was concern that awareness of open access is not widespread in the academic community and

the interviewees might be 'put off' by the question. This section describes the interviewee's responses to the following questions about open access:

- *Are you familiar with the term 'open access publishing'?*
- *If so, could you describe open access as you understand it?*
- *Are you familiar with the 'author-pays' or 'pay-on-submission' model?*
- *How would you feel about this becoming the standard publishing model for all journals?*

Support for open access

There is a distinction between an individual's attitude towards an idea and their behaviour towards it, and open access as a concept is an example of this. Those interviewed generally showed support for the principles of open access, for example the idea of sharing results. One computer scientist said: "Research is pretty meaningless if you can't communicate it. The whole purpose of research rests on disseminating the research", and another stated: "What's science for if you don't have things available?" A sociologist concurred: "Open Access? I think it's a good idea in principle. I don't think knowledge should be owned. Once published it's out there, it has a life of its own, it shouldn't have strings attached".

A couple of people felt that the 'taxpayer' had a right to be able to see the results of research, with a computer scientist stating: "I figure I have been funded by government so that means the public has some entitlement to the work I've done". One of the chemists echoed these sentiments: "I believe work should be published. We are financed by the taxpayer, it should be in the public domain".

One tenet of open access, that commercial publishers are becoming too expensive, was reflected in responses given by a chemist who said: "I try to favour society journals over commercial journals. Because they put something back. But if the paper is good enough for *Nature* I will ditch the good feelings". A computer scientist also commented on this situation:

> A lot of the publications are moving towards open format where all material under open or free publication licenses. In the long run that's the way to go. With books if publishers don't allow copyright to be picked up under open licence – it is a waste of resources. With big publishers, with books it's a case-by-case basis.

While the researchers interviewed generally appear to believe in the philosophy behind open access, many didn't seem to understand the mechanics of how to do it. As discussed in the previous chapter, possibly because they are all housed in well-funded higher education institutions, the interviewees have an acceptable level of access to the literature (except for the UNSW Sociology group). The problem of not having access to research is not one they experience first hand, and even requests for their work from third world countries have diminished since the introduction of the internet. There is not necessarily an obvious immediate need for open access dissemination amongst this cohort.

Attitudes towards open access in Chemistry

While overall the chemists interviewed had heard of open access, the understanding of the details of open access options was less clear amongst this group than the computer scientists. Their misconceptions about open access seemed to mean the chemists were less inclined to support open access. Generally in Chemistry, the focus of open access seems to be open access journals rather than using repositories, and given the main publication output of chemists is in journals, this is hardly surprising. There was some confusion amongst the chemists interviewed about whether open access articles have been peer reviewed. One said: "I have a vague understanding [of what open access is] – a website or electronic resource people can submit papers to. I don't know if it is peer reviewed or just free". Another explained their attitudes:

> Open access, I have heard of the term … I am against. I wouldn't publish that way. For my own work, I have work peer refereed. Journals have immediacy marks that get checked. I wouldn't want to publish where I can't get an impact factor. If I publish in normal journals I will get the impact factor.

There was also some confusion about what 'open access' meant. For example, one interviewee understood what open access was: "open access is freely available and not having to pay", but not how it worked: "It's only open access if the university library has a subscription. Lots of open access material is not journals". Another thought it meant that: "Anyone outside a personal subscription only has access for a fee. It's an online archive of information. I have published in one recently". Another point of confusion for chemists was whether open access material 'counted' for anything in the scholarly communication reward system:

> Open access I understand as being 'everything online' – a repository of essentially everything. There are a couple of Chemistry journals that are open access but there is nothing of importance in them. I don't think we get any credit for it.

In a couple of cases where the interviewees had an understanding of what open access was and supported the principle of open access, this was not enough to publish in an open access journal at the risk of impact factors. For example one said: "I would in principle publish in a open access journal, I don't have anything against online journals, have e-versions only of publication. It is bound to become more common. I would still go on impact factor". Another said they had been "asked to be on the editorial board of an open access journal. From memory I said yes – but I had no intention of submitting anything to it. I am on six editorial boards, some are more important than others. I have no philosophical issues with it one way or the other".

However, a few of the chemists had a clear understanding that open access means, with one explanation being: "everyone can access it. *Nucleic Acid Research* does that. Some have work is available after a period of time, some only for a certain period of time. *PLoS* is an open access journal." Another knew that "you pay a certain amount of money and you can make your work available". And a couple had published in open access journals, "Yes I'm familiar with it. One journal I have published in is *ARKiVOK* [an open access Chemistry journal] I have put about four papers into there".

One interviewee understood that there was a distinction between open access journals and open peer review:

> Well I think there are two variants of it aren't there, one is that it is a journal, a normal journal with refereeing associated with it but there is no charge, it is put on the web, there is not normally a hard copy form. So it's a reviewed journal that is free to air. And in another variant, and I am no expert on open access publishing, and another variant it is both free to air and there is not really that much vetting of it. It people can just put onto bulletin boards almost electronic versions of papers.

It is possible with the second 'variant' described here, the interviewee was either referring to putting pre-prints into a repository or to *PLoS One*[xliii] which will accept papers in most scientific areas after a quick technical review by the editorial board, the community peer review then occurs online after publication.

There was, rather surprisingly given how recent the phenomenon is, a few people who understood the principles of hybrid publishing options (discussed in Chapter 3). One said:

> I like it [open access]. I like to be able to obtain journal articles – like to have my work available to a wider audience as possible. There are hybrids that will

> make your paper available. I don't do that. I would like to but can't afford to. Would love to have research available to the widest possible audience for the benefit of science. I can barely cover costs for doing the research itself … It is another way research is available for free.

However the cost appears to be a prohibitive factor for several people. For example, one said, "I wouldn't want ARC funding to go to open access", and another said the $750 charged by *PNAS* (*Proceedings of the National Academy of Science*) was "too much money … In the US the NSF [National Science Foundation] typically provides money for publication costs out of the grant".

Even those interviewees who didn't know what open access was indicated that some of the issues raised by the open access community such as the cost to the author of publishing were a factor in their decision making:

> There is a certain range of journals I consider. Many don't charge like wounded bulls – one of the issues. The university doesn't like us to publish in journals that levy page charges. One article can cost $1000 US. Many journals charge for the number of pages that you take up in the journal. They will charge for colour plates. Even online only journals do it to cover editorial costs … [I have a] preference for journals that make it available freely. Some are free to publish but you need a subscription. It depends on overall costs. Page charges are one of the biggest considerations. It's a major concern actually. I am always looking to publish in journals that do not charge an arm and a leg to publish there.

Attitudes towards open access in Sociology

The sociologists interviewed showed some awareness of open access, and philosophically the concept seemed to appeal to them. One sociologist said: "I have heard of it. I assume it means anyone can get hold of the downloads. In principle it's quite anarchistic". An example of the understanding of open access amongst the sociology group interviewed is: "I have heard of [open access] but I don't understand much about it. As soon as [the article is] peer reviewed it is online in some journal".

Copyright was mentioned by one interviewee: "I have no problems with it as long as there is an acceptance that it's my work. It's a copyright issue … The idea of an up front payment – fills me with indifference. I doesn't worry me greatly". There are some open access Sociology journals. One sociologist who I later established had published in an open access journal said:

> I don't know if one of my pieces is open access … Philosophically and politically I like the idea – my major priority is trying to choose major journals. I assume newer practices and journals might not be as recognised as a result.

The question of open access books (which do exist) was not raised in the interviews, despite books and monographs being one of the publishing outlets for this group. Unlike the other two disciplines, a couple of the sociologists recognised that there are access issues for people who are not based in an institution. An example was: "The real problem is people who leave the uni. At the time they are used to having access to databases and journals. They are applying for jobs and trying to write up articles but they can't access them [journals]". This is partly because with a move to electronic-only versions of journals, a person 'off the street' cannot simply walk into a library and look up a journal paper. Another sociologist pointed out: "At the library now you have to have a student number and password, you used to be able to just log in [to the catalogue]".

Overall there was a range of understanding and support of open access in the communities in this study.

Attitudes towards open access in Computer Science

Of the three groups interviewed, the computer scientists seemed to be the most aware of open access, with answers like: "Open access – I have heard about it". As a group they had the clearest idea of what open access was, with the most definitive answers being: "Open access is an online non-copyright system everyone can use", "Open access means everyone can get access to research information, the Australian theses are on web". A couple of computer scientists had some idea of the open access premise, but their descriptions showed an incomplete understanding of the concept such as: "Open access publishing - QUT has one", and "It means published work is available to public use in any way they like".

Computer scientists, perhaps not surprisingly, given their work practice of making material available on their personal websites, also seemed to understand reasons behind open access, for example one said: "if it is not an open access journal then you are preventing lots of readers being able to see the work you wrote". Another said:

> I like the OA model for two reasons, one is for the good of the community but there is also a self-interest part. If you go and publish in a place where no-one can read it unless they are in an institution that can pay the $3000 subscription, well then guess what, no-one is going to read your stuff.

This awareness may result from a level of frustration with the amount the academic is asked to do to prepare journal papers for publication: "Many academics are suspicious towards publishers who charge a huge amount. It is the result of publishers wanting camera-ready copy – what is the journal doing for me?" Another interviewee said: "You know its kind of daft these closed access journals – We write the content, we typeset the content, we referee the content and they make the money. It's a well-worn argument". This increase in formatting requirements appears to have occurred in the last few years:

> Before I went into industry there were less hoops to jump through, [papers were] refereed by hand we didn't submit publication ready proofs. They would review the text and the figures as separate things – and they formatted the document. Now [I'm back in academia] it's electronic submission as the final form of the paper.

This frustration was not limited to journal publishers, conference organisers appear to have also increased their expectations. One computer scientist said: "Almost all conferences have switched to pdf [submission]. What I generate is what I use. It used to be that we submitted raw files in LateX and they would modify". Possibly because of this: "Several of the most important journals are managed by the community itself. Everyone in the field feels the way I do".

It appears that the open access debate in the Computer Science community has been occurring since the 1990s, and several interviewees described a few high profile challenges to the publisher's position:

> It is not a factor now but 10 years ago a bitter battle was being fought. A couple of publishers were very expensive. The Head of Department went to the publisher and said unless you agree to reduce charges we will go elsewhere. They called the bluff so we did move. The power ratio changed. That was John Lloyd – *Journal of Logic Programming*. In the mid 1990's there was a lot in electronic journals – I did the same thing, camera ready copy turnaround one month, two months at most. These journals were often started by people close to my area – reviews were much better, close to my field. Now the power has shifted.

> I'll give you a little anecdote, about 10 years ago I went to the major conference of databases and they had a huge panel discussion – these are the top people in databases, and the main person who was advocating it was Jim Gray. He was arguing that his professional association should make all the documents

> available historically and in the future for free on the basis of academic liberty and particularly on the basis of availability for underprivileged people and so forth. And he made a passionate argument. And they did. It has happened, this was the ACM SIGMOD[15] for databases and it has subsequently happened with other groups too, but they were the first to do it.

> Actually in my field there was a journal called *Machine Learning* it used to be published by Kluver, its now taken over by Springer, but several years ago there was a minor cause celebre about open access. Because a new journal was formed, the *Journal of Machine Learning Research* which is a community online only open access journal and it started in 2001 and within a year or a year and a half, maybe within two years it had the highest impact factor of any Computer Science journal in the world and the reason was clear, was because everyone could get access to it, people read the papers more.

According to the interviewees, there are now a considerable number of journals in the Computer Science field that are published as open access journals. One said: "I think AI [Artificial Intelligence] journals make papers available, before the publication in hard copy. I have published in that way". Another interviewee also mentioned an artificial intelligence journal. In addition, another said "logic journals are going for open access". However, simply having things available did not necessarily mean they would embrace it, with one interviewee stating:

> I wouldn't consider [publishing in] open access journals because my work is already freely available. ACM and IEEE are putting material up freely available. Not everything, some stuff is only available to members and some through the library. Older stuff is free.

The cost of author-pays fees in open access to the researcher from their research funds, however, is still a factor: "Ideologically, I believe in open access except they charge, and because there is no grant it is not easy". Several computer scientists discussed their attitude to recent moves towards open access, with one saying: "With open access journals they are the new kids on the block they must demonstrate they are new, different but still good. They must compete with the big guys". Another said:

> A lot of the publications are moving towards open format where all the material is under open or free publication licenses. In the long run that's the

[15] ACM's Special Interest Group on Management of Data

> way to go. Some people have been trying to set up new journals. So far in my area in computing it hasn't been successful yet, there hasn't been sufficient effort into it. It required a lot of work.

One of the people interviewed was a founding editor of an open access journal:

> We publish papers immediately they are final, around 100 papers an issue and steadily increasing. We don't restrict the numbers … Now we publish nearly two times any other journals in field. We receive a paper a day and accept around 1/3, 38% last year. Once a year a company takes our copy and publishes on paper – printing started 10 years ago because some people on the editorial board were concerned about the permanence of the electronic copy … [the journal] is open access. No registration. No income, all volunteers do it.

There did appear to be some small confusion amongst some computer science interviewees, who thought open access meant no peer review, or open peer review. Typical remarks were: "Open access means without peer review", and "I have heard of [open access]. My understanding … It is open for review by whomever comes along. A public review process". Another person said:

> I agree with it [open access] – the problem is peer review status – when I am going to read a paper, the fact a paper appears in a journal or conference means its been peer reviewed. At least I know papers in good journals have been reviewed.

Depositing in repositories

The problem of low participation rates is one faced by institutional repositories worldwide. The generally accepted statistic is that approximately 15% of all academic output is captured in open access form in repositories. One obvious reason for this is the lack of awareness in the academic community of the existence of an available repository. This final results section is discussing the responses to the following questions:

- *What is your understanding of the term 'institutional repository'?*
- *Have you ever deposited any scholarly materials, including pre-or post prints into an institutional repository?*
- *If not, what about on personal or departmental website?*
- *If not why not? Would you consider doing so? What would prevent you from doing this? What would encourage you to do this?*

Generally, the answers given to the questions in this research showed little institutional differences. However in the case of the questions about the institutional repository, there is a difference between the institutions. The ANU researchers have had an institutional repository available to them since 2001. This was an ePrints repository set up by Colin Steele when he was University Librarian in 2001. In 2005, ePrints was absorbed into the new DSpace-based repository called Demetrius, which has experienced fluctuating support due to changing administration practices since.

At the time of interview the UNSW researchers did not have an institutional repository they could deposit into. In theory this should mean that the ANU respondents would be more cognizant with the idea of institutional repositories and be more likely to be actively using one. In deference to this difference, in this next section I state the institution where the quote originated.

Chemistry and repositories

Few of the chemists interviewed were aware that repositories were available to them. Whether they had heard of them or not (in which case I provided an explanation of what they were), the ANU chemists showed little enthusiasm for the concept, indicating that they did not expect that material in the repository would be visible. One person who had not heard about the repository said; "My view is it [material in the repository] would just get buried, people wouldn't look for it." Another person who was not aware of it said, "I don't suppose I think of it as having a high priority". This idea of it being unimportant in this community surfaced again with another interviewee:

> I think I vaguely knew about that. I think all of those things are not taken seriously – not by colleagues overseas. It will never be an alternative, not a replacement. Whether the journal would let you get away with it – having work deposited anywhere else.

Even an ANU chemist who felt they did know about the repository was a little vague on the detail:

> I have heard [institutional repositories] discussed … I am aware there was one at one of the universities in Queensland. I think they were trailblazing weren't they and we followed suit to some extent. So my answer to that was yes I was aware of that here.

The UNSW chemists were more concerned about restrictions on their choice of publishing outlets, saying they would be prepared to use the UNSW repository "if doesn't prohibit me

from publishing in accepted journal". This limitation on publication outlets was raised by another respondent: "I have no problem with it. It's fine as long as it doesn't limit where people should publish. That shouldn't be forced. Effectively anything that's published is in a repository with access". Another interviewee brought up the 'taxpayer' as a beneficiary of putting work into a repository: "I am happy to put things in an institutional repository. It is the taxpayer's money so it should be available. I am not inclined to protect [my work], a lot of people are paranoid".

The question of whether a repository would help the status quo was raised, and the chemists, when asked about whether they would place material in a repository, made comments that indicated they did not have a strong understanding of how repositories work. One UNSW chemist said:

> I like the idea of being able to access everything in a repository. I don't see any harm in depositing in a IR, but I don't see any use in it either. Don't think it is going to be much use. I as a user would like something that's searchable not just for an institution but across all institutions.

Some Chemistry interviewees at the ANU expressed doubt as to whether having material in a repository would be of any benefit to them distributing their work as researchers, given their communities, stating: "I think all of these things [repositories] are not taken seriously – not by colleagues overseas. It will never be an alternative".

Another ANU chemist made the point that there was not a wide market for their work outside the community in which they were already interacting:

> No, [I wouldn't put things into an IR] for any particular reason, it is just another step that I don't see as being of significance to the way I interact with the outside Chemistry world. It wouldn't give me an advantage beyond anything I might acquire through the conventional publishing process. Because all my colleagues that work in the same field as I do have access to the same searching tools and access to a broad library of their own institutions, so I don't think I would gain an advantage in terms of increased exposure to my colleagues. I wouldn't project any further than I do now through the tools that are available to most of my colleagues. At least I don't think that I would.

Unlike their Computer Science counterparts, the ANU chemists showed little interest in their webpage on the university website, which is maintained by the school. For example, one said: "The school website – I don't know who maintains it, I think the school

administrator". Given this, it is unlikely that providing the chemists with an updated webpage generated by the repository will be much incentive to them for use the repository:

> When annual reports come in each school has to write a report. [The] school secretary puts together the publications in previous years. It is always a problem keeping up to date, you are doing it all the time – and you can't do research. It is mandatory DEST reporting. A person in the school keeps tabs.

Several chemists also made the observation that a disciplinary-based repository would be more use for them than an institutional one, with one saying:

> I think it is probably a waste of time for my field. If people are looking for my research they will probably find it through an online journal. They are unlikely to look and see if my university would have it. Mostly people in my field use PubMed and ISI. [A repository] would be more attractive if it's a disciplinary based one.

The reason for this, they explained, is researchers are working in an international community:

> My research community is more independent of the institution in that sense. I have worked in three institutions in 10 years – so if I had a paper here or there [in institutional repositories] I would be all over the place. This is not a continuing position … I don't see the need for a university repository.

Sociology and repositories

Of the three groups interviewed, the sociologists expressed the least awareness of repositories, with one from the ANU saying "I have no idea what you are talking about", and another saying "it does ring a bell, I haven't assimilated yet". However this did not mean that respondents were not keen on the concept, with one saying: "I would put material into it – partly out of misplaced obligation and vanity. … Can't see myself using it. … it would probably get one enquiry a year".

Again there was little awareness of the repository amongst the ANU sociologists interviewed, with one saying: "I have not heard of the institutional repository. It sounds interesting … I do like the idea of the accessibility of it". A couple of people expressed some doubt about their usefulness. One said: "Who accesses it? I guess people who know it exists … I can't think of anything against it. Well it certainly makes sense". Another expressed similar sentiments: "I have not thought about it much. I just assumed

researchers and students have access – they belong to the university who subscribes. Who else would want access? I'm not sure what advantage there is".

There were a few people at the ANU who had at least some idea that there was a repository of sorts available, for example saying: "ePrints I have heard of". As noted above, the ANU repository has not been called ePrints since 2004, but this appears to be the name it is still known by, as another person said:

> The ePrints this university has seems to be a step in the right direction. The issue is the perceived quality of output … ePrints – I printed off some material about it. I met Colin Steele[16] a long time ago. At this stage I have only read about it … I suppose I have never been around when there was a general introduction to what it is and how I might use it.

These two researchers both expressed reluctance to use the repository, with one confusing a repository with social networking such as blogging: "Would I consider using it? I probably would if I was in a comfortable situation of having the time to write regardless of reporting but I don't find the time". The other stated: "Sometimes I'm a bit reluctant – in part because if made a dumb mistake in something I put up I would be embarrassed but it is better pointed out in person than in print".

In the discussions about institutional repositories with the sociologists, one interviewee said they had a concern about plagiarism. Concerns about copyright was also a recurring theme. An ANU sociologist said: "I wouldn't know what the copyright would be for big international journals. But I would imagine there would be a bit of a problem there." A sociologist from UNSW said: "[There are] all sorts of copyright restrictions. US publishers ask you to sign a contract for sole publication rights … [A repository offers] short term gain".

Something that repositories can offer that might appeal to sociologists is the opportunity to bring papers that were published in journals and by publishers that are no longer in existence back into circulation, as one ANU researcher pointed out:

> Certainly the earlier work in smaller journals [could go into a repository]. *Explorations* ceased to exist years go. So you could take that material and pop it in there just to bring it back to life. That would make a lot of sense.

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[16] Colin Steele was the ANU university librarian who implemented the ANU ePrints service. He is also an advisor to this thesis.

Computer Science and repositories

Researchers working in some Computer Science sub-disciplines have an awareness of repositories generally. In some cases it is standard practice for journals to request that when submitting papers to the journal, the author first deposits the paper into a repository then sends the link to the journal (Advances in Theoretical and Mathematical Physics, 2007). One person explained why they thought repository use was low: "Most people don't put things in repositories because they are vaguely concerned the publishers will get bothered about it … but [putting a paper in a repository] is part of the process of submitting a paper to anywhere". Another ANU computer scientist said:

> [There is a repository called] CoRR – Computer Research Repositories - hosted by a US university. With some journals the submission conditions are you have to put your paper in this repository. Then you send them an email and say you have submitted to CoRR … It links straight to the paper.

However this general awareness of repositories did not necessarily translate to an awareness of (or interest in) the institutional repository. For example one said: "The ANU repository – I am aware of it but I have never used it". Another person simply stated, "I was not aware that ANU has a repository", and another had a vague idea, "I remember the name ePrints but I have never investigated it".

There were other reasons not to use a repository, as one UNSW researcher explained: "I don't put stuff online because *Journal of Electronic Publishing*[xliv] is open access. I would only see a need if it didn't publish electronically". This availability of work elsewhere was also given as a reason by an ANU interviewee not to use a repository:

> I haven't heard that term [institutional repositories but a lot of my PhD student's honours theses are on ANU ePrints … I would never have considered putting my published work there, work that is published in other venues, I would never have considered that because it's so easily accessible already. And I would have no idea what the legal issues are associated with that, so I just wouldn't have entertained that idea. I am not opposed to it at all but that's why I wouldn't have considered it, because of the fact that it is already visible.

Even an interviewee who had been an active user of a repository at another institution was unaware of the repository at the ANU, saying: "I have only been at the ANU for two years, before that I was at the University of [name]. I did put some stuff in at the University of [name]. I hadn't heard about it [the repository] here". This lack of awareness did not preclude a willingness amongst some of the computer scientists interviewed to use their institution's repository in the future, with one person stating: "I hope [the ANU has a

repository] it would be a powerful system". Indeed a handful of respondents at ANU had already used the ePrints repository. One said: "It needn't be all that exclusive – I guess I'd be happy enough to develop the habit of submitting to the university and have it made available that way". Another said they had heard of the repository but did not use it. They then stated: "I definitely would support this kind of repository … In the past we had Technical Reports – have to comply with certain format restrictions. It would be nice if everything could be done online – submit online". A third computer scientist said they thought the ANU was setting a repository up:

> My understanding is you put research output into an open repository so you can access it … Technical Reports are going onto Eprints, I have done one of them. It's a great idea. Someone else submitted [my paper] to Eprints. I haven't checked. Normally I don't do it with papers.

These responses are interesting because there appears to be no awareness of the new ANU DSpace repository in the community spoken to in this research project.

The UNSW computer scientists expressed interest in the concept, saying comments like, "I would put work online if [the repository was] available". Others expressed a desire to make things easier to access. One said: "Institutional repositories sound very sensible … Generally I think they are the right way to go". Another agreed:

> I may put things in – provided it can be searched. My main driving force is that people can get to information from the web. You currently have to go to lots of databases. If you go to Google its easier. There is an issue of copyright there.

Despite repositories being referred to by one UNSW computer scientist as not: "the preferred way for high quality publication", they said the community already "publish Technical Reports for research that deserves more audience than those who attend conferences". This could be a way to introduce repositories to the computer science community. One of their colleagues explained:

> We already have a Technical Report series because stuff is on the web … Putting it in archive isn't going to delay it too much. [it's usefulness is] whether it gives you ease of access to material - Does this help me get access to material I'm interested in? People are good at putting stuff on web. It isn't going to turn around people who are crap at putting things on web.

At the time of interview the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC) rules for funding in 2008 had been recently

released. These included for the first time a requirement that researchers make their work available in a repository (Australian Research Council, 2007a) (National Health and Medical Research Council, 2007). Only a couple of people at the ANU appeared to be aware of this. One said: "I am familiar with the new requirement from the ARC – I haven't thought about it. If the ARC limits choices then I will tell them to get stuffed. It doesn't mean it has to be exclusive". Another said:

> I have heard about ARC's request through the grapevine. I am in the process of finalising the paperwork from the ARC. That is why I have hedged my bets, because of the ARC. I would consider that. I would need assurance that the ANU was not getting into trouble. Provided that Elsevier and Wiley have no problem with it. I would actively support it.

Several interviewees noted problems with repositories based in an institution. One issue for the computer scientists was not the concept of repositories themselves, rather the fact that it was an institutional repository. Because of the way computer scientists look for information, the interviewees felt that material in institutional repositories would not be found by other researchers. One ANU researcher said they were hesitant to contribute to "institute oriented databases" because, "there is a complete reorganisation of the Department or College every 1.5 years so the name of the school, environment etc changes. It is impossible to find my work in a hierarchical home page". Another said: "I am not sure if individual institutions should have repositories. It complicates the task of finding things … An institutional repository would be useful if it is universal – all publications are there rather than a select few".

The issue, said one computer scientist, was whether people would look for information in a repository:

> First they will look for machine learning sites that might aggregate these things. Second they will look for me individually, then maybe third if they ever even think about it they might think he is at this institution, lets see if the institution has got it. And in fact in reality they are going to type my name and the title in Google Scholar and click through to all of the versions. Because you know there is multiple versions, because with some of my papers there is 37 versions around on the intranet. … So it is not obvious to me what the value is of a central repository that an institution like the ANU would set up, given that people can have their own webpages.

Generally it appeared that a subject-based repository would be better received by this community. One person said: "Repositories that are managed by individuals or small groups have more longevity … My publications are picked up by Google Scholar anyway". Another mentioned subject repositories already in use: "There are things like arXiv – for Maths or Physics so lots of people will stick stuff there. That is useful for claiming precedence because they stick a time stamp on it." Again, the issue is whether people will search for material in the repository. As one computer scientist said

> There is one issue that I would want them to consider, and that is that if there is a tradition in our field of making stuff publicly available then people expect stuff to be on our webpage or on the ACM[17], they are not going to go looking for the ANU ePrints place.

The general feeling amongst the computer scientists appears to be that material is already available on individual researcher's web pages, and much of the conference proceedings are open access, so there is no need to duplicate this by putting material into a repository as well. In addition, a few computer scientists indicated their concern that the university administration would be unable to provide a system that would work: "I will put things into the ANU repository but it depends on how well they do the job … Typically websites designed for novices are very painful for me. I want to use a sophisticated interface".

The nature of the discipline of Computer Science means that researchers in the field are using and developing high-level software. Many people in the field are using electronic versioning systems to collaborate internationally via the internet. There is no conceptual barrier to using a digital repository for completed work. As discussed earlier, there is a culture of making publications available to other researchers by maintaining a personal website and by writing publicly accessible Technical Reports.

The lack of awareness of institutional repositories

The lack of awareness of institutional repositories seemed to run across all disciplines at both universities. There was some wry amusement at the question: "What would the repository need to do for you to deposit in one?" with one typical answer being, "I would have to know about it". Other comments made by ANU computer scientists included: "They have to promote this repository. Simplify the procedure to submit", and "I would need to be aware [there is a repository], and it needs to be easy to do". Another suggestion

[17] Australian Computational Machinery

for ensuring uptake and use of the repository was that the uploading process be a simple one:

> I am not sure with copyright forms if publishers allow open access in a university. Because I put everything on my webpage anyway, it is extra work. If it is a simple web page where upload pdf, and that is all I have to do as an academic I would be happy. If it is more complex [to deposit] it's duplication. Most people would prefer to have their own web page than have their work in a repository.

It should be noted that at the time of interviews (and the situation had not changed 18 months later) the process of depositing a paper into the ANU repository was extremely complex. The repository site was only accessible from a menu off the library page, and depositing required initial registration on the site, and then a seven-step process. Another suggestion for making the repository helpful or relevant to researchers was tying it into the reporting process. For example a chemist at UNSW said: "It would be good to tie into the reporting. Speed is another issue – I am worried another is about to produce the same work. It could be a registration of work". An ANU chemist had a similar idea: "We are routinely supplying a copy of our published work for money related to publication outputs. Submitting to an institutional repository wouldn't be any different to our [current reporting]". A computer scientist at the ANU agreed:

> … [tying the repository to the research office] would appeal to me. The ad hoc reporting of research publications is an admin drag. If there was some standard way of doing it, you know I have to go and update my webpage with my publications, if I could just do it that once somehow and it was automatically known and made available to everyone that would be great.

Certainly the impression from the interviewees was that the current reporting system is onerous and frustrating, indicating that any system which alleviates this would be welcomed. A chemist at UNSW said: "I don't know what benefit it [the repository] is for me, it sounds like more work to do it. We already fill in a DEST form every time we write a paper … I wonder what incentive there is apart from counting articles". A computer scientist from UNSW saw the repository as a potentially helpful tool: "I would like a repository I think – all stuff should go up there by default. Should be obliged to go up there. DEST have trouble getting data – it is tied into conference travel money". Finally, a computer scientist from the ANU thought depositing would be a comparatively simple process: "I don't have any problem with submitting a preprint. I can see it would be

beneficial. It would be much easier than what we do [for reporting] – the administrator sends an email around".

Summary of engagement with open access

The chemists, with a few exceptions, were somewhat confused about what open access means and are certainly wary of it. Several raised concerns there may be restrictions on where they can publish and that therefore open access would affect the impact factors of their work. In the couple of cases where the interviewees had an understanding of what open access was and supported the principle of open access, this was not enough to publish in an open access journal at the risk of having lower impact factors. Those who had published one or two papers in an open access journal had not done so out of a principled stand for open access, but simply because it was the appropriate journal for what they were publishing.

The sociologists interviewed showed some awareness of open access, and philosophically the concept seemed to appeal to them. While many of the sociologists were hazy on the details of open access they responded positively to the idea when it was explained to them. The main concerns in the Sociology group about depositing material into a repository were around plagiarism and copyright.

Of the three groups interviewed, the computer scientists seemed to be the most aware of open access. Most of the computer scientists interviewed are practising it by various means, such as their work practice of making material available on their personal websites. There are open access dissemination options in Computer Science because, as a few interviewees explained, the open access discussion occurred in the discipline a decade ago. Computer scientists, perhaps not surprisingly, seemed to understand reasons behind the open access concept. Some computer scientists are already using repositories but show a preference for subject based repositories over institutional ones, and this appears to be for reasons other than being unaware of an available repository at their institution.

Overall the awareness of the availability of an institutional repository was very low amongst the interviewees and only a handful of people had actually deposited anything into a repository, institutional or otherwise. There was very little distinction between the institutions when it came to awareness of the availability of their institutional repository, despite the ANU repository being technically operational for six years at the time of interview. This reflects the uneven administrative support the repository has had over that period. The issue of 'branding' the repository is an interesting one. Amongst the

whole population of ANU interviewees, any reference to the ANU repository by name was to ePrints which ceased as an entity in 2004. There was not a single mention of Demetrius.

Summary

As the interviews progressed, it became clear that there are no obvious differences emerging between the universities. While the individuals showed great diversity in their work and attitudes, the most striking observation was that individuals within a discipline were highly convergent. As would be expected, their work practices - in terms of publication output, amount of time spent refereeing, and information seeking - were similar, but this similarity flowed into other areas. Knowledge of and attitudes towards copyright issues for example, while convergent within, were clearly divided between disciplines. Attitudes to having their own research material freely available in open access form was also divided along disciplinary lines.

The interviews undertaken at QUT supported many of the findings described in this and the previous chapter, and a discussion of that work is in the next chapter.

Chapter 7 - Implementing repositories

Introduction

As discussed in Chapter 4, the Queensland University of Technology (QUT) was chosen as a case study to triangulate this research because at the time it was the only university in Australia with a mandate requiring academic staff at the university to deposit their work into the institutional repository, QUT ePrints[xlv]. Interviews with the Deputy Vice Chancellor (Technology Information and Learning Support) and the eResearch Access Coordinator from QUT were conducted, with emphasis on the planning and implementation of QUT ePrints. Of particular interest were the challenges QUT has faced and the processes it has developed to overcome barriers to the adoption of the repository. In 2008, despite having a mandate in place, and having undertaken several years of advocacy within the academic community, the repository is still not collecting all of the university's research output as open access items.

The interviews at QUT were conducted after all the interviews with the research sample at the Australian National University (ANU) and the University of New South Wales (UNSW) were completed. Preliminary analyses of those results were indicating that the themes of 'information-seeking behaviour' and 'disciplinary differences' would be central to answering the research question "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?". The interviews at QUT strengthened this perspective and these themes are discussed in depth in Chapter 8, with reference to the QUT findings where relevant. However, careful analysis of the interviews at QUT uncovered a third theme that had strong bearing on this area, that of the 'diffusion of innovations', which will be discussed in this chapter.

Institutional repositories clearly represent a new innovation, defined by Everett M Rogers in his book, *Diffusion of Innovations* (2003) as "an idea, practice, or object that is perceived as new by an individual" (p. 12). The diffusion process is concerned with communication of a new idea to members of a social system, described as: "a set of interrelated units … engaged in joint problem solving to accomplish a common goal" (p. 23). The implementation of repositories into the academic community fits neatly into these definitions. This chapter will begin with a description of the process QUT undertook to introduce the repository into the academic community, before discussing the barriers the

administration faced with this process. This chapter will then use a framework of diffusion of innovations theory to discuss the introduction of repositories to the academic landscape in terms of QUT, and the wider Australian, situation. As Rogers (2003) said: "the diffusion paradigm allows scholars to repackage their empirical findings in the form of higher-level generalizations of a more theoretical nature" (p. 105).

The diffusion of QUT ePrints

It is helpful to begin with a summary of the process QUT undertook to encourage use of the QUT ePrints repository. This summary is compiled from a combination of the interviews conducted at QUT for this thesis and two published accounts of the implementation of the QUT mandate (Callan, 2006b; Cochrane & Callan, 2007).

Prior to the launch of QUT ePrints there was an effort to collect some material so that there were items in the repository for the launch. Paula Callan, who later became the eResearch Access Coordinator, approached several key researchers and requested their permission to place some working papers and conference papers into the repository. In this instance she deposited the items on their behalf. QUT first launched QUT ePrints in November 2003 with approximately 50 papers in it, and the QUT ePrint deposit policy was endorsed in January 2004. QUT spent several years on awareness programs and advocacy before their 2004 mandate was widely understood (Cochrane & Callan, 2007).

The initial awareness campaign run by QUT was comprehensive. There was a formal launch event inviting all department Heads and Directors of Research. In addition press releases appeared in the university newspaper, brochures and posters were produced and there was a feature advertisement on the library web page (Callan, 2006b). The message that QUT was giving the researchers was about the benefits of open access for the section of the research community that did not have access to research journals. Despite this multi-pronged approach, self-depositing remained very low.

Next, authors with a high publication rate were approached and reminded of the policy to deposit. The Heads of Schools were contacted to remind them of the university policy, group-specific workshops were held to demonstrate depositing. In some cases research assistants were employed to assist with the depositing process. Despite the encouraging number of items in the repository after a year, the rate of self-deposit (as opposed to university-assisted deposit) remained a low percentage of the total items deposited (Cochrane & Callan, 2007).

Barriers to repository uptake experienced at QUT

Callan returned to those researchers who had agreed before the rollout to have their work included in the repository to ask why they were not putting their other articles in, when they had agreed that the repository was a good idea. These discussions unveiled several barriers to the uptake of the QUT repository.

One simple issue was that of language. In discussion with researchers, Callan had been using the term 'post-print', which is an expression used widely in circles of repository managers and open access advocates. It is not a commonly used term amongst researchers. She discovered that the expression 'final corrected post peer review draft version' was generally understood. There were three other barriers. One unanticipated barrier was locating the post-print, and a second barrier was the lack of time available to deposit work. The most problematic barrier was the difficulty of preparing items for deposit.

When they began the awareness campaign, QUT found about one third of their researchers had not kept post-prints of their work. Many of those who had kept their post-prints were unable to locate them. Callan explained in the interview that this situation has now changed:

> The message to the researchers since the establishment of the repository is that the final corrected draft version is precious, it is like gold. That is the version we can most likely make open access so please keep it handy and make it available for deposit as soon as it has been accepted for publication.

There was not a great deal the administration could do about the time restraints on the researchers, although Callan did point out that one of the most prolific authors at QUT is also one of the highest depositors to the repository. It was the third, problematic, barrier of preparing items for deposit that QUT has addressed.

With the initial launch, the researchers were asked to locate their final draft (their post-print), convert it to a pdf and deposit it. They were also asked to check the copyright policy of the publisher of that paper on the SHERPA/RoMEO website[xlvi] to ensure they were able to deposit their work. When Callan spoke to the researchers she discovered that both of these requests were an issue, as she explained in the interview:

> Outside the Faculty of Information very few people knew how to convert a Word document to a pdf. So the first thing I did was said it doesn't have to be in pdf, all we want is your final corrected draft version it can be in any format and

> we will convert them. It was very simple for us to do the conversion. That was a barrier that needed removing.

An even larger barrier was the concern about copyright. The researchers were very concerned about inadvertently infringing the copyright of the publisher or undermining the agreement they had signed. Often they hadn't kept a copy of the agreement so they couldn't recall what they had signed or couldn't remember the exact terms. Callan explained to me that it was too great an ask to expect the researchers to check the copyright status of their work themselves:

> These were the things that needed to be addressed. So we said deposit the final corrected draft version. They could check or we would undertake to check standard policy of that publisher and enable a level of access that was consistent with that policy.

Undertaking these two steps made the deposit process much simpler for the researchers. In addition, QUT minimised the amount of metadata they required the researcher to provide, not asking for anything the library could locate themselves from the work (such as the author, title and journal). In addition the library has begun a database of publishers from whom they have obtained specific permission, preventing replication of permission requests in the academic community. Once the library took responsibility for checking copyright and converting files to pdf, the deposit levels rose dramatically.

The barriers to the uptake of the QUT institutional repository have been a lack of awareness in the first instance, then issues related to the perception that depositing was a complicated process. There was also concern about damaging the relationship researchers had with their publishers. The QUT library was able to address these barriers by developing a mandatory policy, which has been widely disseminated by various means through the community over several years, and by altering the deposit process so the library takes responsibility for the more complex tasks. This chapter will now look at the diffusion of repositories into the Australian academic landscape in the context of diffusion of innovations theory.

Diffusing repositories into the Australian academic environment

The introduction of institutional repositories to the academic environment has had, in effect, two 'diffusions'. The first step in the process is for an institution to develop a

repository. This requires recognition by the institution that a repository is required, and commitment in the form of funds and staff to create one. The second step is to encourage academic members of the institution to deposit their work into the repository, either by providing staff to do it for them or by simplifying the process enough to allow self-depositing. These two discrete steps can individually be described in terms of the diffusion of innovations theory, and the next two sections will describe each in turn.

The first diffusion: developing repositories

Broadly, diffusion in this context is the process where an innovation is communicated through certain channels over time among the members of a social system. In the initial diffusion of repositories into Australia, the 'social system' in this example refers to institutions. Due to the focus on academic output in this thesis, this analysis is restricted to universities and does not include the several other types of institutions (for example: national and state libraries, the Defence Science and Technology Organisation, CSIRO) which are currently using or developing repositories. It also does not include repositories that service the Australasian Digital Theses[xlvii] project.

The acceptance and building of repositories in institutions in Australia fits with the s-shape curve of adoption of innovation. There are 39 universities in Australia, and as of September 2008, 32 had a repository (Kennan & Kingsley, 2009). The ANU was the first institution in Australia to build a repository when it launched its ePrints service in 2001. This classifies the ANU as an 'early adopter' in diffusion theory[18]. Between 2002 and 2005, 10 further repositories were launched in Australian universities, representing the 'early majority'. In the past three years 21 repositories have launched, these can be classified as 'late majority'. Those institutions that do not develop a repository at all come under the 'laggard' classification in diffusion theory (Rogers, 1983).

In diffusion theory, innovations are more likely to be adopted quickly if they have higher perceived levels of: relative advantage, compatibility, trialability and observability and with less complexity. Each of these will now be discussed in terms of the 'perception' of repositories by the institution.

Considering the first issue of *advantage*, repositories represent a high level of relative advantage to institutions in economic terms, social prestige factors and convenience, as

[18] Technically, as the first to adopt the technology, the ANU could be classified as an 'innovator' but given the description of innovators in Roger's book, it is probably closer to the spirit of the theory to move them down a rank to 'early adopter'.

they potentially provide a simplified reporting system that is quantifiable and searchable. Indeed, as discussed in Chapter 2, having academic outputs available in an open access format tends to increase citations. This alone could provide enough of an advantage to an institution, given the recent focus on university ranking tables, discussed in Chapter 3.

Turning to the second issue of *compatibility*, Australian institutions already collate statistics about the academic outputs of their staff for Higher Education Research Data Collection (HERDC)[xlviii] reporting every year which is used by the Australian Government to allocate funding to universities. Repositories potentially provide a streamlined system for achieving the same goal, so repositories have a high level of compatibility with "existing values, past experiences, and needs of the potential adopter" (Rogers, 1983, p. 15), which in this case is the institution administration.

The third issue of *trialiability*, the degree to which an innovation may be experimented with on a limited basis, and the fourth of *observability*, the degree to which the results of an innovation are visible to others, are linked in the case of repositories by the software behind the repositories. Repositories are built on a platform of either open source or proprietary software. In Australia the most frequently used repository platform is Fedora (which is open source) in combination with proprietary software system Vital. The remaining repositories in Australian universities are using Eprints or DSpace with a few exceptions (Kennan & Kingsley, 2009). This means any institution wishing to create a repository has a choice of five different software platforms, and by consulting other institution's repositories, is able to observe how these function, how easy they are to navigate and how much computing and people-power is needed to run them.

It is likely the fifth issue of the *perceived complexity* of building the repository has the highest influence in terms of adoption. This issue explains the lag time between the ANU's 2001 ePrints debut, and the recent flurry of repositories in Australian repositories. Again, as more institutions develop their repositories, there is greater opportunity to see functional repositories. In addition, the development of an Australian community of repository managers to turn to for assistance and advice, such as the Online Research Collections Australia Support Network [xlix], and the Repository Technical Support Service[l] reduces this perception of complexity.

In Australia, the government has been attempting to introduce an Accessibility Framework, which is intended to improve access to research information, outputs and infrastructure (Australian Government Department of Education Science and Training,

2007). Under the Accessibility Framework, the government is intending to explore "how to encourage institutions, research organizations or individuals that receive public money to make the results of their research publicly available as soon as possible" (Harvey, 2008). This includes a requirement for universities to develop repositories to support open access, and there are also: "Opportunities to change HERDC specifications to require submitted publications to be open access or potentially just the metadata" (Cooke, 2008). Currently the Australian Research Council (2007a), and the National Health and Medical Research Council (2007) require researchers to consider placing any publications from their research into an appropriate subject and/or institutional repository.

This top-down governmental approach to the introduction of repositories can be defined as a 'centralised diffusion' of an innovation, where the overall control of the decisions is made "by national government administrators and technical subject-matter experts" (Rogers, 2003, p. 396). It can be argued that the Australian Government has effectively mandated that institutions create a repository. Certainly, out of a total of 32 repositories in Australia in September 2008, 21 were established after the release of *The Recommended RQF* report in 2006 (Kennan & Kingsley, 2009).

Another factor demonstrating the introduction of repositories into Australian universities as an example of centralised diffusion is the lines of communication about the process. During the preparation for the now defunct Research Quality Framework (RQF), the university administration – usually the library or the research office or a combination of the two – was in communication with the Department of Education, Science and Training and responded to their requirements. DEST chose to communicate directly with an individual RQF liaison officer at each university, and this list of people was not released to the general public. By expecting the liaison officer to communicate information about the expected use of these repositories with their own university populations, the Australian government abdicated any responsibility for informing the academic population.

As this chapter is exploring, it is possible to analyse the process of introducing repositories to the Australian academic population in terms of diffusion theory. It would seem, at least in the Australian scenario, that a centralised approach to the diffusion of repositories into universities has been successful. The next section will analyse the steps taken by an institution to ensure the success or not of their repository in the context of diffusion theory, with references to the QUT ePrints repository.

The second diffusion: filling repositories

Early in the debate about institutional repositories, the general assumption was that the difficult issues were technical ones and once these had been addressed and the repositories were functioning, then researchers would willingly place their work into them. This is the technological determinist approach, that argues that "once a machine has been invented, its ability fundamentally to transform social relations is only a matter of time" (Walsh & Bayma, 1996, p. 662). This scenario did not happen and it became obvious that the 'build it and they will come' approach was flawed.

In retrospect it is easy to be critical of this early attitude, but it is not uncommon:

> Many technologists think that advantageous innovations will sell themselves, that the obvious benefits of a new idea will be widely realized by potential adopters, and that the innovation will therefore diffuse rapidly. Unfortunately this is very seldom the case. Most innovations, in fact, diffuse at a surprisingly slow rate (Rogers, 1983, p. 7).

Institutional repositories have not 'caught on' with researchers, as their benefit to the individual is not immediately obvious. This has been borne out by this research but was also an observation of the work my research drew upon: "while their benefits seem to be very persuasive to institutions, IRs fail to appear compelling and useful to the authors and owners of the content" (Foster & Gibbons, 2005). This observation is crucial to the issue of the diffusion of institutional repositories in Australia.

Paramount for any repository is to develop a policy framework to define the role of the repository service (Henty, 2007), and any policy introduced must be recognised at the highest level in the university: "High-level management support cannot be underestimated ... this [is] crucial to establishing policies that can contribute to repository development, take-up and population" (Proudman, 2008). The QUT mandate requiring all academic researchers to place a copy of the final version of their peer reviewed and corrected papers into QUT ePrints could be perceived to be a centralised approach. However, the policy has never been enforced in that there is no punishment for non-compliance. The university has chosen not to use "the mandate as a blunt instrument, but instead finding a way to support the process" (Cochrane & Callan, 2007).

A deposit mandate has several uses. Not only does it indicate the institution's position about the repository and ensure a faster uptake of the repository, but can also provide a negotiating tool when in discussion with publishers about copyright. When a paper was deposited that had been published in a journal where the publisher policy was unknown,

the QUT library would send a permission request to the publisher explaining what they were doing and why, and asking for permission for all papers from QUT authors published in their journal to be able to be placed in the repository. Callan explained in the interview why the policy was helpful:

> … in that email I would send to the publishers, I was able to put that at this university it is a policy that all academics are required to put a post-print version in the open access repository, therefore I am asking for permission to do this. We had an incredibly high success rate – partly because of the impact of the policy. So if the publishers realise these authors have got to do this there is not point in them turning around and saying no. We had very few negative responses to these emails.

These permissions were recorded, and while this process was initially time consuming this database has became a resource for the library.

It has been repeatedly shown (Callan, 2006a; Cavanagh, 2006; Weaver, 2006) that the most successful repositories in Australia have achieved results by using a decentralised diffusion system, where "horizontal networks among the clients are the main mechanism through which innovations spread" (Rogers, 1983, p. 7). Considering that innovations are more likely to be adopted quickly if they have higher perceived levels of: relative advantage, compatibility, trialability and observability and with less complexity, institutional repositories face difficulties on all these counts to varying extents.

The initial lack of enthusiasm in the QUT academic community to have an active role in the repository has been experienced by other institutions attempting to introduce a repository:

> while staff may be sympathetic many of them do not have the time or the inclination to contribute. They were happy to give us permission to do the work on their behalf, but could not commit to doing the work themselves. Clearly the advantages of institutional repositories were not yet sufficiently convincing to academics to persuade them to play an active part in the process (Mackie, 2004).

Having a mandate alone does not guarantee instant awareness and complete compliance as the QUT experience has shown. At the time of interview, nearly four years after the implementation of the mandate, the repository was finally capturing the majority but not the complete output of the university. One approach that had increased deposits to the repository was providing direct benefits to the researchers. For example creating

individual pages for researchers, which can act as their 'work output' web page, provides a major benefit for users of the repository because researchers can use the url for their personal page in their email signature. This fulfils the *relative advantage* requirement that "the adopter perceives the innovation to be more advantageous than the idea or process it supersedes" (Rogers, 2003, p.15). Other related incentives can be beneficial. For example the University of Minho, in the year after implementing a mandate policy combined with a financial incentive, experienced a 390% increase in repository use (Ferreira, Baptista, Rodrigues, & Saraiva, 2008).

Repositories are more likely to be adopted if they are *compatible*, "consistent with existing values, past experiences and needs of the adopter"(Rogers, 2003, p.15). It is possible to maintain that implementing an institutional repository is fundamentally a matter of marketing the idea to the academic community. With this in mind, disciplinary differences must be taken into consideration when deciding how to 'pitch' the idea of the repository to different groups.

One of the reasons that QUT has had relative success with the rollout of their repository could be the cohort of researchers at their university. Houghton et al. (2006) note that one of the benefits of enhanced access is the potential for much wider access for sectors of the economy such as practitioners. These include nurses, doctors, medical and scientific lawyers, teachers and accountants who work in fields that benefit from research but are often not in a workplace that subscribes to the relevant journals. Field researchers – for private organisations and for government departments – are also similarly disadvantaged. These are the benefactors of having material available as open access. It follows, then, that institutions with these cohorts such as QUT might be at an advantage when implementing their repository.

Certainly, QUT experienced a higher level of acceptance with certain disciplines, Callan explained in the interview:

> I found that any discipline with a large practitioner base who could use the articles could see the benefits, for example nurses who are out there no longer studying so they can't keep up with the literature if they don't have open access. This way they can find the most recent articles on diabetes or whatever. It's the same for teachers: if they are not studying how are you going to get the education literature out to them? And (sic) Business – how are you going to reach small business people, the accountants etc? That argument was more persuasive for those disciplines than it was for say high-energy Physics or Chemistry where there are not many people not associated with an institution.

It is perhaps surprising then, that the author who consistently heads the 'Top 50 Authors'[li] list in QUT ePrints is researching and publishing in Chemistry. With over 108,000 downloads of his papers in the 12 months to September 2008, a possible explanation for this extraordinary interest is some of his work is in the field of environmental Chemistry – another area where there are many field practitioners not tied to institutions.

However, regardless of these benefits provided by the repository, if the discipline in question has social norms that are in conflict with those required to participate in repository use, then it is unlikely there will be an embracing of the technology by many more than the innovators in that group. A good case study demonstrating this is an example of economists detailed in Chapter 8.

The *perceived complexity* issue was discussed above. There are several aspects to depositing work in a repository that appear complex to a first-time user, where the repository is "perceived to be difficult to understand and use" (Rogers, 2003, p.16). These include locating the author's post-print, converting this to a pdf and checking the copyright status of the work. QUT addressed these issues by providing administrative support for the academic. These changes were made at the beginning of 2005 and the rate of deposit "went up dramatically" as a result.

The final diffusion challenges of *trialability* and *observability*, whether a repository "may be experimented with on a limited basis" and if the results of the repository are "visible to others" (Rogers, 2003, p.16), is being met at QUT with the provision of download statistics to the academic community. The front page of the QUT ePrints site links to the Top 50 authors statistical page. This 'evidence' that people are accessing the papers held in the repository has been a powerful argument to persuade the scientists at QUT to become involved. QUT found that providing download statistics helped 'sell' the repository idea. This underlies the perspective that the most effective method of diffusing the repository idea is using peer to peer networks.

Peer to peer networks

When considering the diffusion of an innovation using a peer to peer process, it is important to look at the way information about work practices is disseminated within the community. In the academic environment, this is traditionally the 'master/apprentice' system, partly based on the tradition of hard sciences. The researchers interviewed in the empirical part of this research described varying experiences in their introduction to both

the craft of writing, and the implications of publication choice. This discussion is based on the questions about any instruction the interviewees received, and are providing to their own students, about the publishing process. Somewhat surprisingly, this question was a 'sleeper' question. It was initially devised to try and establish how much of an awareness researchers had about both the logistics of publishing and the implications of publishing. What emerged however was very different. The responses gave clues as to how the publishing 'system' is meant to work, and indications that it is not working.

As discussed in Chapter 4, of the three disciplines explored in this work, Chemistry is the discipline that best fits the description of a hard science, and the apprenticeship system is still entrenched in this discipline. It may be many years and students may have several papers on which they are listed as an author before they actually undertake the writing of a paper. Under the apprentice system in Chemistry, it is common practice for a postgraduate student to undertake experiments devised by and supervised by the academic. The academic then writes up the paper, acknowledging those who worked on the experiment in the author list. While students in the later stage of their PhD may be permitted to write drafts of papers, these will be revised by the academic before submission. It is not until a chemist becomes an academic in their own right – given a lectureship for example – that they begin to write their own papers. Obviously individual chemists will exert different levels of control over their work, with some of the interviewees indicating that they actively encourage their students to write drafts as 'practice' where others did not seem to find this necessary. Many of the Chemistry interviewees said they had not received any instruction about how to publish because their supervisors had done all the work for them. Some Chemistry interviewees in turn did not spend any time instructing their students on how to write, preferring to write the papers themselves, even those generated from the PhD student's research. This was described as a matter of convenience.

Somewhat unexpectedly, given the emphasis on writing in Sociology (as a social science), and conversely the formula and code-based text inherent to Chemistry and Computer Science, it was the sociologists who described a rather haphazard mentoring system for learning to write articles. The Sociology interviewees indicated there had been very little mentoring from their supervisors. In the absence of this instruction, many interviewees had looked elsewhere for advice, such as asking friends or seeking out mentors later in their careers.

Many of the Computer Science interviewees described having to work out how to write a paper and where to send it on their own. However there were some examples of good, systematic training, or at least encouragement, such as the supervisor writing the more complex part of early papers for the student. Sometimes students are asked to write draft papers which then go through a series of iterations and corrections by the supervisor.

Peer to peer and repositories

Despite universities having a vested interest in increasing their publication output (this is primarily where the publish or perish insistence is generated), the universities that were the subject of this research appear to do very little at an institutional level by way of assisting students to learn the trade of writing articles, let alone explaining the 'system', that some journals or conferences are valued more highly, for example. Teaching the art of succeeding in a given discipline is left to the individuals within the discipline, and this appears to be undertaken with different levels of enthusiasm and structure depending on the communication norms and the individuals in that discipline.

Currently academia relies on the master/apprentice system at disciplinary level to pass on information about the publishing process – a process that is embedded in all disciplines and accepted across all research areas as necessary for success in the world of academia. This research has shown that the system is haphazard at best. Therefore relying on the same peer-to-peer networks for something that is not seen to be essential to the academic endeavour, such as using a repository is likely to encounter problems.

It is not sufficient merely to inform people of the existence of a repository, as has been demonstrated. Because institutional repositories are perceived as highly complex, it is important to also provide 'how-to knowledge' which: "consists of information necessary to use an innovation properly … in the case of innovations that are relatively complex, the amount of how-to knowledge needed is much greater than in the case of less complex ideas" (Rogers, 2003, p. 173). Using the peer to peer information structures currently in place by relying on individuals within a discipline to disseminate information and enthusiasm about an institutional repository could be a barrier to any institution wishing to roll out their repository. This method will have varying levels of success depending on the norms in place in that discipline already.

Summary

The interviews at QUT have proven to be a pertinent choice for the triangulation of the empirical aspects of this research. The case study of the introduction of QUT ePrints to the

academic community is a good example of the diffusion of innovation theory, and has implications for other institutions in Australia facing the challenge of introducing a repository to the academic community. These findings are highly relevant to answering the question: “How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?”. The next chapter will consist of a discussion of the results, which will incorporate other aspects of the QUT case study not included in the analysis in this chapter.

Chapter 8 – Implications of findings

Introduction

This thesis began with the premise that that there are challenges facing the scholarly communication system as it stands, partly because it is not taking advantage of the technologies now available to provide a more appropriate system for today's academic landscape. In addressing the question "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?", this research has focused on the individual scholar as the key to any change to the scholarly communication system, because they engage with the system on a daily basis. The empirical aspect of this thesis was a series of interviews with researchers from three disciplines at two Australian universities.

This chapter begins with an overview of researchers' understanding of open access before looking at the findings concerning the 'researcher as author'. These are related to the issues identified with the scholarly communication system which were outlined in Chapter 2. These issues are the Reward, Certification, and Awareness function of journals. This section also explores whether concerns about copyright are shared by research communities. The chapter then discusses the 'researcher as reader' findings in terms of information seeking behaviours of the three disciplines interviewed.

The final section addresses aspects of how the individual researcher communicates with all members of his or her working community within the framework of disciplinary differences.

Researcher understanding of open access

The interview questions about open access asked respondents about their awareness of, attitudes to, and engagement with open access. These revealed an interesting range of opinions about the merits of open access. One of the premises of this research was that the general lack of awareness is only a small factor in the reason for the low engagement with open access. Certainly the interviewees showed a low level of awareness of open access, a similar finding to the Rowlands (2004b) report.

By asking interviewees to use their own words to describe the term open access, misconceptions about what open access means were revealed. One misconception was that open access means a 'free for all' on the web, where anyone can put up anything. This is a powerful disincentive to use open access dissemination options for those people under this impression. Generally the respondents' awareness of institutional repositories was low, although many people indicated that the concept of a repository was appealing once they understood what it was. This mirrored the findings of Swan & Brown (Swan & Brown, 2005) which looked at a broad academic population and Allen (J. Allen, 2005) who studied researchers in the humanities.

There was an element of "ignorance and inertia" described by Swan and Brown (2004b, p. 69), but the reason for the low uptake is considerably more complex. As would be expected, direct answers to the research question do not leap from the interviewees' answers. However analysis of the responses has revealed that the reasons why people support open access and why they use institutional repositories are as varied and complex as the reasons why they do not.

This work has found that considerable differences were observable at the discipline level in terms of awareness of, and attitudes to, repositories and open access, and these are part of the reasons why the positive attitudes and expressions of intent about open access found in earlier studies are not translating into action. The chemists, with a few exceptions, were somewhat confused about what open access means with several raising concerns about restrictions on where they can publish. Even those who had an understanding of what open access was and supported the principle did not publish in those journals. The issue for chemists was the perception of lower impact factors. The sociologists interviewed showed some awareness of open access, and philosophically the concept seemed to appeal to them. The main concerns in the Sociology group about depositing material into a repository were around plagiarism and copyright. The computer scientists, on the other hand were very aware of open access, and most were practising it by making material available on their personal websites. Some computer scientists are already using repositories but show a preference for subject based repositories over institutional ones, and this appears to be for reasons other than being unaware of an available repository at their institution.

Scholarly communication – researcher as author

This research takes a holistic view of the researcher as communicator. It is not simply a discipline's culture of communicating information through formal journal publication that

needs to be considered in this context. The broader aspects of communication, such as the social systems and reward values of a discipline, the refereeing expectations, the value of informal communication, and other aspects of the researcher's daily interaction with colleagues within their institution and within their international network, play heavily into the debate.

Chapter 2 discussed how issues with the traditional scholarly publishing system, such as the high cost of subscriptions and delays in publication, pose barriers to the efficient dissemination of knowledge. The literature demonstrated that despite these issues being identified and discussed by the library community and open access advocates for many years, there is not a great enough recognition of the issues within the broader scholarly community to create a groundswell of action. This was borne out by the respondents in this research. Overall, the researchers interviewed did not express concern about the scholarly communication system. The interviewees generally gave two answers to the question: 'Why do you publish?'. One related to communication, the other was about reward. Respondents in all the disciplines said they primarily publish to encourage dialogue with their peers and because it is a requirement of their funding by the taxpayer, tying into the Awareness and Reward functions of the journal.

Awareness

Chapter 2 identified two reasons why the function of Awareness is being compromised in the traditional scholarly publishing system. One is that high subscription costs pose a barrier to the widespread dissemination of published work. As this is primarily an information seeking issue it is discussed in more depth in the next section. The second issue, that delays in the publication process create a barrier to the use of journals as a communication tool, is discussed below in light of the research findings.

Almost without exception the interviewees said their primary reason for publishing is to communicate their findings with colleagues. There certainly was recognition amongst the interviewees that the long lead times to publishing in journals are problematic when wanting to communicate results. There are different norms about how long it takes to publish articles in each of the three disciplines. Each of the disciplines has managed to work out ways of 'getting around' the long lead times of journal publishing through the use of informal communication methods. This is possible because the group of people with whom they wish to communicate directly is quite small. In particular, computer scientists appear to be in favour of widely disseminating their work and have managed a way around the delays in journal publication by placing emphasis on conference proceedings

instead. Most of the computer scientists tend to put links to their own work up on their websites. They have found a discipline-run solution away from journal publishers.

As discussed earlier, Awareness can be improved through open access (the increased visibility argument), however this argument is only effective if individuals within a discipline are looking for information in ways that are likely to locate items in open access outlets. Therefore the information-seeking behaviours of any group of people will have a direct impact on their likely uptake of open access. Information seeking is discussed later in this chapter.

Reward

All the interviews indicated very strongly that research reporting is an example of an incompatible administrative structure being imposed onto academic endeavour. This is partly because, as this research demonstrates, researchers have a stronger loyalty to their research colleagues than they do to their institution. When an institution imposes publication practices upon researchers at odds with the practices that are considered acceptable by their own community, there is evidently conflict.

The results have demonstrated that a central issue in answering the research question is the scholarly communication practice of managing an academic career through publication record. Most of the researchers interviewed indicated that unless their work was published, it effectively had not occurred. However many interviewees described a situation where they are forced to publish in ways that are not natural to the work they are doing, nor to the communication system they have established with their peers. Despite the earlier observation that, “external status tends to be more important than immediate employment status for many scientists and, indeed, often determines it in the public sciences" (Wiley, 1984), practitioners are having to adjust the way they would naturally communicate to fit the administrative requirements of the institution in which they are based.

Researchers are very busy, having many aspects to their standard workload. The process the interviewees must follow to apply for grants is considered lengthy and tedious and most people expressed some level of frustration with the system. Promotions committees also cause problems for many researchers who find they must change their preferred publication methods to fit with the expectation of the committee for their career advancement. It appears that the reporting system has inherent difficulties, and this stems from the system being developed by university and government administrators. As will be

described below, researchers themselves have little awareness of disciplinary differences, so it is not surprising that university administrators appear to be completely unaware of them. Within the three disciplines interviewed for this research, each academic population has established systems that address problems in communication, but they experience difficulties when it comes to complying with requirements handed down by the administration at both the government and institution levels.

While there are arguments that the days of the scholarly journal are limited (Kingsley, 2007), the scholarly publication system is currently deeply embedded in the reward system used in academia (Steele et al., 2006), and until this changes the journal is likely to remain. This research has shown that researchers face divided loyalties – both to their employing institution (more so if their work involves the use of expensive equipment) and to their international network of colleagues. Publishing behaviours are to a large extent determined by the reward and reporting requirements of the institution, funding body and/or government for whom the academic works. One of the premises of this research was that the reward function of scholarly journals is one of the main barriers to a change in scholarly publishing behaviour and the findings bear this out.

While the findings unveiled the central role Reward plays in communication decisions, they also demonstrated the arbitrary importance of Certification and copyright on publishing decisions.

Certification

The delays experienced in publishing are substantially due to the Reward function increasing the need to publish more which in turn affects the amount submitted for publication and therefore the amount of Certification required. One of the questions arising from the interviews is whether peer review is a productive use of researchers' time. This relates to the 'Researcher as Reviewer'. An obvious starting point in answering that question is how much time researchers are actually spending reviewing. The current scholarly publication system relies on peer review – of papers, of theses, of promotion applications. While the researchers interviewed spend a considerable amount of time refereeing papers, they indicated this is an accepted part of the scholarly process and they understand it to be a contribution to their scholarly communities. Peer review works on the gift relationship principle (Akerlof, 1982), in the eyes of the interviewees it is a 'gift' researchers bestow upon their fellow researchers. The gift is not to the publisher, or to the institution sending the PhD thesis or to the grant body. They review because they expect others to review their work. Many of the chemists and computer scientists quantified their

reviewing in terms of their own output – for the system to work, each person must review in proportion to the amount they publish.

The argument that new publishing models, including open access, potentially offer more efficient ways to administer peer review does not appear to be compelling for the academic group studied. While many of the researchers interviewed expressed dissatisfaction with the amount of peer review they were required to do, none of them argued there was a need to change the system, other than allowing for some professional recognition of the work. Problems with the peer review system are not a catalyst for change.

Copyright

It would appear that despite the high level of discussion and analysis of copyright amongst open access advocates, and the undeniable need for copyright issues to be resolved for open access to be successful, there was little concern about copyright amongst the three groups interviewed. This was either because they were unaware of it or because they ignore copyright restrictions. Copyright therefore is not a burning issue for many researchers. It is a barrier to widespread open access on a logistic level, but it is not a barrier at the individual's philosophical level.

Because giving away copyright to publishers in exchange for publication is not a major issue for the researchers interviewed, they do not necessarily see any need for change. Of the three groups interviewed, the computer scientists expressed the greatest awareness of the copyright situation, and many of the computer scientists interviewed are blatantly flouting their copyright agreements by placing their work onto their websites. In fact, rather than copyright issues being a catalyst for change, the interviews showed copyright was likely to be a factor in the *resistance* to moving to open access scholarly communication. In discussion about the option of placing copies of their work into a repository, many of the chemists and sociologists expressed concern about contravening copyright. This finding supports the work of Pinfield (Pinfield, 2001). Their concern was exacerbated by the lack of understanding of many respondents regarding the copyright agreements they had signed with their publishers.

As recommended in Chapter 3, in order to understand why open access dissemination options are not being embraced, a broader, more holistic view needs to be taken of the communication practices of researchers, and this is the focus of the remainder of this chapter. The next section discusses the importance of information seeking behaviours,

before taking a look at disciplinary differences and how these are key to answering the research question.

Scholarly communication – researcher as reader

One of the reasons the Awareness function of journals is becoming compromised in the current scholarly communication system is the high subscription costs of journals. However the findings indicate that these do not register with the research community interviewed. These researchers are based in institutions in first world countries and already have access to most of the journal articles they require because their institution subscribes to them. In addition, almost all interviewees described systems for obtaining any material that is not available in their institutional libraries. Sometimes these are quite elaborate, such as the sociologist who stores up all the missing references until s/he travels overseas to another institution. Many of the interviewees also use the libraries at nearby institutions. The 'close enough' method of finding similar papers was another popular alternative.

This means that access to the literature is not necessarily an issue for this group, and unlikely to be a pressing enough concern to encourage a change of publishing behaviour. This was also the experience at QUT when they initially tried to encourage uptake of their QUT ePrints repository: "Messages about the altruism of open access or the rising journals prices seem to make little impact" (Callan, 2006b). QUT has found that demonstrating how search engines will find a particular academic's papers is a more effective way of encouraging people to deposit into the repository.

The findings of this research support the ideas articulated in Chapter 2, that traditional arguments used to encourage open access are ineffective. Researchers are not a homogenous group, and broad criticisms of the scholarly publication system are not resonating with them. They do not see a reason for change. It is possible this demonstrated lack of interest accompanied by attempts to find alternative ways of communicating research, is an issue of perspective rather than resistance. Researchers with a standard researching and teaching load are often too busy to consider the scholarly publishing system as a whole. Many interviewees in all three disciplines described workloads that were more than full time, and it was not at all uncommon for people to mention working at home in the evenings and on weekends. Even the researchers interviewed who were ostensibly in research-only positions described considerable teaching and administrative responsibilities. To achieve a successful uptake of a repository these cultural issues must be taken into consideration.

Like Lynch (2003) and Pinfield (2001), this research has found that researchers do not have the time, resources or technical expertise to ensure the preservation of their work. Providing administrative support as suggested by Chan (2004) and implemented by Callan (2006b) encourages more deposits into institutional repositories, but this is only part of the problem of low engagement with repositories. My research has found that disciplinary differences in information-seeking behaviour are important factors of a researcher's willingness to embrace open access scholarly communication. To date, the existing research into information seeking behaviours across all disciplines has not been specifically applied to the question of researcher engagement with open access[19].

Researchers in all three disciplines described looking at a specific topic, either because they are reviewing a paper and wish to ensure that the topic has not been covered elsewhere, or because they are writing a paper on the topic and need to ensure that they have seen, or are aware of, all other work in the area. This type of information seeking is described as directed searching for specific information in the literature. The second type of information seeking is undirected searching in a wider field which can unearth results which link into other fields (Back, 1962; Menzel, 1962). While the term 'keeping up with the literature' might be considered quaint in some disciplines and irrelevant in others, it is still a practice undertaken by the interviewees in Chemistry. It is directed searching that is of most relevance to the uptake of repositories. By looking at the specific tools the different groups of researchers use to find information, clues can be found as to the usefulness or not of a repository to that group.

Information-seeking behaviour of the chemists

The chemists described regular engagement with the literature, with most using email notification, although some still read printed versions of journals. This general move to electronic journal use is due to the proliferation of electronically available information and represents a shift from attitudes in 1995 when chemists were one discipline surveyed as part of an Honours Thesis at UNSW. At that time, the chemists as a group expressed suspicion about the validity of electronic journals (Kingsley, 1995). The interviewees in 2006 and 2007 indicated that they use a series of tools to find information online including Web of Science and Chemical Society Abstracts. However, the search tool used

[19] Addressing the information–seeking literature can be problematic, because the terminology used varies considerably, with terms such as information seeking behaviour, information channel studies, communications research, knowledge-based information, or diffusion of knowledge studies, all appearing to mean the same thing (Detlefsen, 1998).

by almost every chemist interviewed was SciFinder, which does not search institutional (or any other) repositories. It is a "single source for scientific information in journals and patent literature from around the world" according to the home page[lii]. The chemists in the sample interviewed for this research were far less likely than the other two disciplines interviewed to use Google.

This finding indicates that Chemistry is unusual, given that a study of over 1000 researchers (Swan & Brown, 2005) found that 72% of the respondents used Google as their first-choice tool for finding information on a topic. This apparent contradiction of results is one example of why it is important to consider disciplines in isolation from one another. My research found that 100% of the computer scientists used Google as their search tool.

The chemists in this group were generally unaware of institutional repositories and many could not see the point of using them. They also expressed concern that if they were to place information in a repository, no-one would know to look for it there. Of course, the idea of the repository is that the searcher does not need to go to the institutional web page, they can use a search engine such as Google or OAIster and find the paper, almost without knowing they have found their goal through a repository. A few chemists misunderstood the nature of repositories, stating that they thought placing material in a repository was a substitute for publishing in journals, and indicating this would not be an option because it would not 'count' for Reward systems. This concern that open access dissemination does not carry weight within the academic community reflects the finding by Swan and Brown (2004b).

However, considering chemists' information-seeking (rather than publishing) behaviour, this mis-perception, that items in a repository would not be found by other people, reflects the way chemists currently search for information. They go to the database where information is housed rather than conduct general searches. The non-use of general search engines by the chemists means that the argument that placing pre or post prints in a repository will increase the visibility of chemists' work is problematic. The research community with whom they wish to communicate is searching for their work elsewhere.

Information-seeking behaviour of the sociologists

The sociologists in the sample rely on a combination of journal articles and books for their information, and described doing 'serendipitous' research, such as following citation leads and working through bibliographies. This method of looking for information is sometimes

called ‘snowballing’. These responses reflect the long-standing observation that the growth of the literature in the humanities is unstructured, and that “new developments are based upon a ‘random raiding of the entire archive of the literature’” (Price quoted in (Crane, 1972), p. 94).

The sociologists, like the other two groups, generally have access to the articles they need. However a large source of literature for them is books. Many of the sociologists interviewed said they bought their own books. One of the reasons this is necessary is because the soaring costs of journal subscriptions, combined with the bundling systems of publishers since 1990, means there is little library budget available for books. In 2002 the ANU Library acquisition budget was “roughly 83:17 serials to books” (Steele, 2008). Despite this, the cost of journal subscriptions did not feature at all in the interviews with sociologists.

The finding that sociologists are buying their own research material goes against general non-discipline-specific research which indicates that, overall, individuals are paying less often for personal literature: “the number of personal subscriptions per scientist has decreased steadily from about 5.8 in 1977 to 2.2 subscriptions per scientist currently” (Tenopir et al., 2003). While the Tenopir work was looking at journal subscriptions, and the sociologists are buying their own books, this finding is another example of why research in this field needs to be discipline specific.

Information-seeking behaviour of the computer scientists

In Computer Science, far more so than the other disciplines interviewed, it is common practice for an academic to have a personal website with all their published papers listed on that site. Putting the legal copyright implications of this practice to one side, this is an interesting conundrum for an advocate of a repository. Those researchers who put their papers into personal websites are already practising open access. Nearly all the material they use is available freely online via a Google search. Using personal websites might not address some of the sustainability issues that repository developers are trying to resolve, but in a fast-moving discipline, most material is out of date very quickly so this is not necessarily a priority. There are evidently serious copyright issues with this practice in some cases that should probably be addressed for the researchers, but if the repository manager’s focus is on achieving open access, then energy would be better spent, in the case of Computer Science at least, addressing the copyright problem rather than trying to encourage those researchers to alter their behaviour and use a repository.

Summary of scholarly communication findings

These results show that despite many flaws with the scholarly communication system relating to Awareness, Certification and Reward, the researchers interviewed generally did not express a great deal of concern about the publishing, reviewing or researching aspects of remaining engaged with the literature. The issue of Reward however remains central to their publication choices. In addition, these findings indicate that the arguments used by advocates of open access, in relation to author loss of copyright and high journal subscriptions are not important enough to the research community for individuals to change their publication behaviour.

However the findings also show that there are clear disciplinary differences in relation to publishing and information-seeking behaviour of researchers. These are central to the reasons why different disciplines are embracing open access with different levels of enthusiasm. Differences between disciplines extend beyond researchers' publishing behaviour into every facet of their formal and informal communication practices. They explain why subject-based repositories are more successful than institutional ones, why there is an inherent conflict between institutional and disciplinary communication requirements and why centralised approaches to diffusing repositories are encountering a higher level of resistance than anticipated. The next section looks at researcher engagement with repositories, and how disciplinary differences are a critical factor.

Researcher engagement with repositories

In a discussion about researcher engagement with repositories it is important to distinguish between different types of repositories. This will be addressed first, before a discussion of the willingness of each of the three disciplines to use their institutional repository.

The findings relating to information-seeking behaviour indicate that a disciplinary group will be more receptive to the concept of using a digital repository (subject-based or institutional) if the members of the group search for information in a way that will result in finding repository items. This conclusion was supported in the triangulation data, as Callan observed of the QUT researchers in her interview:

> Some groups were more receptive than others. I found that the people with a strong connection to a subject vocabulary like MESH, these people are less likely to accept that argument [of increased visibility of work] because they don't use Google. Any disciplines that do use Google it helps. This will actually facilitate access. It is also the argument we use for accepting books because the

> ePrints will act as a 'billboard for the work'. We put their contact details in there if they want more information.

Subject-based versus institutional repositories

While institutional repositories benefit the institution, this does not necessarily serve the needs of the researchers. Rogers (2003) makes the point that "the name given to an innovation often affects its perceived compatibility and therefore its rate of adoption" (p. 250). As discovered by Foster and Gibbons (2005), the nomenclature has indicated to the academic community that the institutional repository is designed to support and highlight the achievements of the institution rather than provide any benefit to the individual academic. A few respondents in my research said they could not see how the institutional repository would help them, commenting that it would however be useful to the university administration. My research shows, however, that the reasons for low uptake of institutional repositories are more complex than a matter of terminology. Rather, the lack of engagement is because of complex disciplinary differences in scholarly communication practice, including information-seeking behaviour.

In Chapter 3, the relative success of subject-based repositories compared to institutional repositories, was described. Clues to why this is the case lie in the results of this research, which indicates that the reason for this is the social norms already established in different disciplines. For example, arXiv is successful because physics is "a small community of people who work in harmony with each other and who know each other's reputations" (Taubes, 1993). ArXiv has become intricately linked with the information-seeking behaviours of the researchers who use it, and this is predominately because it is a subject-based repository rather than an institutional one.

If disciplinary social norms are central to the uptake of repositories, then the argument that diffusions are more successful if managed as a decentralised system, grounded in diffusion of innovations theory, becomes clearly relevant to this discussion. In a decentralised system, the participants can make decisions about the diffusion process and create and share information with one another to reach a mutual understanding (Rogers, 2003). Decentralised systems are likely to fit more closely with the user's need and problems. Institutional repositories are not decentralised systems, but subject-based repositories are, which in part explain the different levels of uptake between them.

An example of how adopting an institutional repository to incorporate disciplinary norms can be achieved emerged in the QUT case study. The Economics discipline provides a good example of how the information-seeking behaviour and reward structure in a particular

discipline affects the relative advantage aspect of the diffusion of an innovation into that discipline.

The case of the economists

Generally, economists worldwide use a subject-based archive called RePEc[liii] (Research Papers in Economics) as a system for sharing papers. Participants can deposit material through their own institutional repository, or directly to the RePEc repository. Economists evidently already have a culture of sharing working papers online, which means they should be a group that embraces institutional repositories. However, there is a problem. In the Economics discipline, metadata is collected by a related service called IDEAS[liv] (Internet Documents in Economics Access Service), which provides information about working papers and published research to the Economics profession. This system collects download statistics from RePEc and sends out a monthly mailing to registered individuals about the popularity of their works, their ranking and new citations found. These download statistics are important 'currency' for economists. Any economist who places an open access version of their work (as opposed to a metadata page) into their institutional repository as well as RePEc, risks a dilution of the statistics about their work collated by IDEAS. This is because any download that comes from the institutional repository rather than RePEc is not 'counted' by IDEAS. Obviously this is a disincentive for economists to deposit items into their institutional repository.

QUT has approached the person who wrote the software for RePEc about the possibility of having QUT economists deposit their working papers into QUT ePrints and have RePEc harvest the metadata to create a RePEc record. The ePrint record would point visitors to RePEc so that downloads would all be initiated (and counted) via RePEc. Callan explained in interview that this: "is an example of a disciplinary difference. You have got to find a way to work with that group – you are not going to persuade them to change their practice" (Callan, 2007).

Considering diffusion theory in this case, exposure to RePEc has demonstrated to the economics community that archives can provide benefit, and are not complex. It has allowed economists to trial using an archive. In theory this means they should be willing to embrace the technology. However, there is a clear relative disadvantage in using an alternative repository unless that repository becomes compatible with the "existing values, past experiences, and needs of [the] potential adopters" (Rogers, 1983, p. 15). This one example demonstrates that despite outward appearances of 'innovative' behaviour by

a group towards a new system, an internal social reward system may work counter to that group embracing a new technology.

The case of the economists illustrates one of the major barriers to the uptake of open access scholarly communication in Australia. Any alternative dissemination of research outputs to traditional publishing must not only be easy to use, and provide obvious benefit to the adopter, it must also not threaten any established social or reward norms within the community of which the adopter is a member. Evidently, trying to provide a 'one-size-fits-all' solution to the challenge of opening up accessibility to research outputs is not going to be successful.

The Computer Science challenge for repository uptake

The nature of the discipline of Computer Science means that researchers in the field are using and developing high-level software. Many people in the field are using electronic versioning systems to collaborate internationally via the Internet. There is no conceptual barrier to using a digital repository for completed work. In addition, there is a culture of making publications available to other researchers by maintaining a personal website and by writing publicly accessible Technical Reports. In some Computer Science sub-disciplines it is standard practice for journals to request that when submitting papers to the journal, the author first deposits the paper into a repository then sends the link to the journal. This means that researchers working in those sub-disciplines at the very least have an awareness of repositories generally.

While much work is being done on the interoperability of repositories so they are able to ingest items between software platforms, a lack of standardisation of what type of material is accepted into different repositories and the way the metadata is collected can cause difficulties to a user trying to locate items. Several computer scientists mentioned issues with standardisation, including the difficulty of being in an institution where the organisational structure changes every ten years, and the problems of keywords meaning different things in different countries even within a discipline.

Another issue was not the concept of repositories themselves, rather the fact that it was an *institutional* repository. Because of the way computer scientists look for information, the interviewees felt that other researchers would not find their material in institutional repositories. Generally it appeared that this community would be more prepared to accept a subject-based repository. The general feeling amongst the computer scientists interviewed was that material is already available on individual researcher's web pages,

and much of the conference proceedings are open access, so there is no need to duplicate this by putting material into a repository as well.

A summary of researcher engagement and disciplinary differences

Overall, the awareness of the availability of an institutional repository was very low amongst the interviewees and only a handful of people had actually deposited anything into a repository, institutional or otherwise. Clearly a considerable barrier to the use of the ANU and UNSW institutional repositories is the lack of an awareness and advocacy program at both institutions. The biggest factor in answering the research question however is disciplinary differences in scholarly communication practices.

Disciplinary differences in scholarly communication

When considering the researchers' responses to questions about scholarly communication, from both the researching and the authoring perspective, what became apparent in this research was the marked differences between the disciplines in the way they interact with the literature. To say that disciplines differ from one another is a truism, however, the extent to which they differ, not only between disciplines but also within them, clearly emerged as an important factor in this research. Disciplinary differences are established during the training researchers receive as students and postgraduates. The academic world is built on a master/apprentice system that, as Chapter 7 discussed, enjoys varying levels of success.

Disciplinary differences and research

Particularly in the sciences, research builds upon itself, as researchers report small steps in the movement towards an answer to a large problem that many people may be working on. Newton's famous quote, 'if I have seen further it is by standing of the shoulders of giants', is a lyrical description of this phenomenon. In order for this progression to occur, it is essential for researchers to communicate their findings to one another.

In this discussion it is therefore necessary to distinguish between scholarly communication and scholarly publication. Scholarly publication is the formal process of having discrete articles published in peer reviewed journals and conferences, and of publishing books. Scholarly communication incorporates scholarly publishing, but also encompasses informal communication. Academic endeavour is in many ways a social activity and social factors within a research area affect the dissemination of information (Crane, 1972).

The differences in publishing output between disciplines results from the general 'speed' of the endeavour in question. Fast moving research with many people working on similar topics is described as urban (using the analogy of urban life) (Becher & Trowler, 2001). Of the three disciplines interviewed for this research, Computer Science is the fastest moving, with research often out of date within a year. Sociology, by contrast fits squarely in the category of 'rural' research, where an individual researcher may be the only person world-wide working on a given topic (Becher & Trowler, 2001). Books are an appropriate format for publication in this context. Many of the people interviewed in Sociology described delays in journal article publication of two years. Chemistry falls between the two disciplines, with the researchers in different sub-disciplines reporting a range of publication times from as short as two weeks, although the outside expected time to publication was around four to six months.

The findings from this research have demonstrated that communication (as opposed to publishing) between individual researchers and within small academic research areas often bypasses the formal system. Members of each of the disciplines described communication techniques that suit their own needs, which are determined by their discipline. Specifically, the introduction of the Internet (which, as described in Chapter 1, represents a seismic shift in communication in the order of that of the printing press) has allowed for new types of communication previously unimagined. These 'Web 2.0' techniques, such as blogs, wikis, Skype (to mention a few) are being adopted by different disciplines at different rates, enthusiastically embraced by the computer scientists and barely mentioned by the chemists, for example.

As has been explained, this research indicates that a major barrier to the uptake of open access scholarly publication is the different forms of publishing outlets within individual disciplines. However, simply identifying differences between disciplines may not be enough to determine successful ways of implementing repository use, as disciplines themselves encompass a series of sub-specialisms.

Disciplinary differences and research reporting

Many of the interviewees in all three disciplines expressed frustration at the promotion and grant funding processes to which they are subject. Members of promotion committees are, by necessity, comprised of researchers from different disciplines, who may have a limited understanding of the work being assessed. This clearly emerged as an issue with interviewees themselves who had little awareness of how other disciplines function. This was most clearly evidenced in the responses of interviewees who had moved disciplines

and had been forced to embrace a new publishing regime, in particular those who had moved into Computer Science from other areas such as Philosophy, Biology and Chemistry. Many of them mentioned how different it was, or that they had previously held disparaging ideas about the Computer Science publishing process but now realised it was highly rigorous.

The literature on disciplinary differences provides many insights into this phenomenon. For example previous research looking into cross disciplinary awareness has shown that "academics seem to be surprisingly hazy in characterising other people's subjects of study, and their stereotypes of both subjects and practitioners are in general neither particularly perceptive nor particularly illuminating"(Becher, 1981, p. 110). CP Snow (1965) described the problem of 'two cultures' of literary intellectuals and scientists and between them, "a gulf of mutual incomprehension – sometimes … hostility and dislike, but most of all lack of understanding" (p. 36). This gulf of understanding yawns not just between science and the arts, it can also be seen between disciplines that broadly constitute 'science'. One example is the lack of understanding within disciplines of the value of other disciplines' publication outputs (Kling & McKim, 1999), which was demonstrated again in my results. Evidently publication is merely one manifestation of an entire subculture of a discipline.

The research described in this thesis has uncovered a serious implication of this lack of understanding of other disciplines. The findings indicate that university administrations are hindered in their understanding of the myriad of work practices and social norms in different disciplines. A clear example of this lack of understanding is the reporting requirements imposed upon researchers by university administration and funding bodies. This finding supports the premise made early in the research, that the reward system is central to the ultimate success or otherwise of any change to scholarly publishing. It extends it, however, to include the statement that disciplinary differences must be considered in any discussion that involves altering publication behaviour, such as making work available in an open access format.

Disciplinary differences and amending publication practice

The interviewees' concerns included the amount of time that was spent in preparation for grant and promotion applications, however the main difficulty experienced was the necessity to publish in particular journals to gain recognition. A recent University of California study supported this finding, stating "that the current tenure and promotion system drives [academics] to focus on conventional publishing activities that are accorded

the most weight toward their professional advancement" (The University of California Office of Scholarly Communication, 2007).

The interviewees described using a variety of methods to increase their publication output, such as 'salami slicing' their research into smaller papers than they would normally choose to, and only sending their work to Thomson Reuters-ranked journals. There was a wide recognition of having to 'play the game' to stay ahead. This modification of publishing behaviour to satisfy administrative requirements is not unique to the groups interviewed. As discussed in Chapter 2, the behaviour of researchers changing their publication to suit assessment has been observed before. However, the findings demonstrate that the implications of this are far wider than simply an administrative burden on researchers, but that this phenomenon is one aspect of what I have dubbed the 'institutional/disciplinary divide', which is one of the biggest barriers to the widespread uptake of open access dissemination, particularly institutional repositories.

The institutional/disciplinary divide

As has become clear through this research, there is a conflict between the needs of the individuals in a given discipline and those of the institution in which they work, which has implications for the success or otherwise of one of the open access dissemination options, institutional repositories. I am describing this as the institutional/disciplinary divide.

The literature on disciplinary differences can illuminate this phenomenon also. For example, the concept that science itself is a commodity that can be controlled and manipulated for political goals is not a new idea, Whitley (1984) pointed out that,

> 'Science Policy' has become both an area of research and a set of administrative practices as the modern sciences have developed into a major, and expensive social institution which requires 'steering' and monitoring by state agencies who are assisted by a variety of research groups and units" (p. 2).

In modern academic life, certainly in Australia, directives originate in government, and are carried out by university administrators. This mirrors a process Whitely also observed: "Goals are set by the administrative hierarchy in much industrial research but work processes are, usually, decided by scientists on the basis of their training" (1984, p. 18).

As discussed earlier in this chapter, the researchers who were interviewed function in small groups, and these groups regularly consist of colleagues other than those within the university. Often they are an international group of like-minded colleagues. The disciplinary differences literature indicates this trend is reflected in research groups

world-wide: “disciplinary cultures, in virtually all fields, transcend the institutional boundaries within any given system,” (Becher, 1994). Because of the requirements of teaching undergraduate programs, subject groups must have team members between them that can teach across the discipline, and “this generally means that appointments are made to fill gaps in specialisms, rather than to reinforce existing research expertise: so colleagues who teach together are unlikely to be readily able to combine their research interests” (Becher, 1981, p. 118).

The interviewees in this research described networks of between one and 20 people, reflecting ‘research networks’, described as a relatively intensive concentration of interest ties, with no defined boundary (Woolgar, 1976). This finding supports earlier disciplinary difference research that shows sub-specialities are very small, and it is not uncommon for scientists to be working in a number of different specialties (Hagstrom, 1970). Becher (2001) found that generally academic circles will have an immediate group of approximately 5-20 people. A larger group of interested researchers might encompass about 200, but that is the extent of people who would have a direct research interest in an individual’s work.

These social and research networks, sometimes referred to as ‘invisible colleges’, are very small, comprising not the discipline, but the sub-speciality that makes up a particular individual’s inner circle. It is the intimacy of these groups that conflicts with institutional goals. It is not surprising that many researchers find their research colleagues outside their own institution. This research has demonstrated that the researchers interviewed often have a greater loyalty to their research community than they do to their institution, a finding which supports the observation in the disciplinary differences literature that: “external status tends to be more important than immediate employment status for many scientists and, indeed, often determines it in the public sciences” (Whitely, 1984, p. 16).

However while their own research community may be the audience of choice, researchers in Australia are constrained by reporting requirements on several levels that conflict with this community. Academics must report to their institution for promotion, to the Australian Government via their institution for university operational money and directly to granting bodies such as the Australian Research Council and National Health and Medical Research Council for external research grants. This schizophrenic situation is causing headaches for many researchers and is a highly inefficient use of researcher’s time. Obtaining grants was repeatedly given in answer to the question: “Why do you publish?”.

Institutional repositories exist to serve the institution and funding bodies, rather than the individual. This disconnect between the needs of the institution and those of researchers' invisible colleges means that "by forcing academics to report in a fashion at odds with their natural flow of work and community, the potential for widespread uptake of repositories as a method of achieving open access is unlikely to succeed."[20].

There has been little reference in the open access literature to the phenomenon of conflict between institutions and disciplines, with the exception of a small Cornell University study, which concluded that "Each discipline has a normative culture, largely defined by their reward system and traditions. … institutional repositories will need to address this cultural diversity" (Davis & Connolly, 2007), and a recent South African policy paper which referred to a 'largely unchartered clash' between research and innovation policies on the one hand and the traditionally-accepted model of academic publishing on the other. This paper argued that performance measures effectively inhibit the effective dissemination of research (Gray, 2007).

Disciplinary differences and repository diffusion

Institutional repositories have the potential to provide an efficient solution to many of the administrative requirements of Australian universities, and have been developed by a large number of Australian universities for several reasons. These include reporting requirements for the Australian Government, as is explained in Chapter 7, internal promotion purposes, and grant applications. One of the reasons there has been low voluntary uptake of repositories in Australia is that they appear to have been developed as a uniform administrative solution for institutions. Many Australian university repositories have a stated purpose which is often in the spirit of 'making research output more accessible' (Kennan & Kingsley, 2009). However, it seems that little energy has been directed into making these repositories fit the highly variable and specific needs of the disciplines within their institutions. This tendency of university administrators to create uniform administrative solutions which can be inappropriate for the different disciplinary cultures housed in the institution, has been noted in the disciplinary differences literature (Becher, 1994). However, to date, this observation has remained largely absent from open access discussions.

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[20] This is a quote from the paper mentioned in Chapter 4, which, because of circumstances beyond my control, has not yet been published. However, the preprint of the paper has been in the ANU repository since May 2007 (http://dspace.anu.edu.au/manakin/handle/1885/45158?show=full).

It would be instructive to consider disciplinary differences in context of diffusion theory in any repository rollout. Disciplinary differences will affect the willingness of a given group to embrace a new work practice, such as depositing items into a repository. As discussed in Chapter 7, diffusion theory argues that innovations are more likely to be adopted quickly if, within the group adopting them, they have higher perceived levels of: relative advantage, compatibility, trialability and observability and with less complexity (Rogers, 1983). Note the issue is 'perceptions' not absolutes, and given the differences between disciplines, these perceptions will differ accordingly. The interviews conducted for this research demonstrated this phenomenon clearly.

Based on the interviews for this research, many, if not the majority, of researchers at UNSW and ANU at the time of interview (the end 2006 and beginning of 2007) were yet to reach the first, 'knowledge', stage of what Rogers (2003`) described as the five-stage innovation-decision process (p. 169). While the interviewees were not statistically sampled to provide numerical analyses, the overwhelming lack of awareness of institutional repositories, let alone the existence of the repository at their own institution amongst the interviewees, cannot be ignored. Considering also that the interviewees volunteered themselves for interview, and might therefore be assumed to be interested in the issue, the lack of awareness is even more surprising.

QUT, having undertaken to approach the roll-out of their repository using a mixture of a centralised approach (the mandate) combined with the peer to peer approach, and even with a concerted effort and resources allocated to the project, took several years to build momentum. This would indicate that at least in the case of those universities where researchers were interviewed, and certainly in universities where a repository has been recently implemented, the need to address the five steps in the innovation-decision process, knowledge, persuasion, decision, implementation and conformation, is one of priority.

Global frameworks

There have been several studies released after the research for this thesis was undertaken, and this section briefly places them within the framework of this thesis. Some of these studies have continued the tradition of online quantitative studies in the open access field, for example, one international online survey conducted which included 688 scientists from 49 countries which showed the general attitude toward the open access principle is extremely positive (T. Hess, Wigand, Mann, & Walter, 2007). This study faces

the same limitations of other surveys described in Chapter 3, in that it is a large international survey and an attitudinal study, and while adds to the body of this type of information, does not delve into the wider question of *why* researchers hold these attitudes or why their behaviour does not reflect these attitudes. The work showed that although there is recognition of the open access advantages of increased speed, reach and potentially higher citation rates, the barriers seem to be insufficient impact factors, the lack of long-term availability and the inferior ability to reach the specific target audience of the immediate circle of scientists in their own field.

In addition, there have been several recent articles looking at particular aspects of the challenge of encouraging uptake of institutional repositories, including a case study of faculty adoption of the University of Minho's repository (Ferreira et al., 2008), and an article describing Oregon State University's attempt to engage the academic community in issues of scholarly communication (Boock, 2007). These studies have made suggestions such as developing value-added services that can enhance existing communication practices and using people within the discipline to help explain and 'sell' the benefits of using open access options. The reason why these techniques would work lie in the findings of this thesis, that only by recognising and reflecting disciplinary communication norms and using peer to peer networks to communicate information will institutional repositories be more appealing to researchers.

Several studies have been published which support the argument that peer to peer networks are essential to the effective diffusion of the repository idea. A study of the 123 members of the Association of Research Libraries asked about library-initiated education activities (Newman, Blecic, & Armstrong, 2007). This study assessed the effectiveness of different advocacy techniques, finding the most effective to be one-on-one meetings. This finding simply underlines the argument put forward in this thesis that the individual scholar is central to the success or otherwise of any open access initiatives. Advocacy was the focus of another recent publication, which compared the approaches of CERN, the University of Minho and Southampton University to populate their repositories (Proudman, 2008), and advocated establishing a mandate for the repository because this is "a clear signal that an institutional repository is a priority for institutional management" (p. 60). I agree that mandates indicate institutional commitment, but argue that the institutional focus of repositories are a considerable part of the reason why researchers are *not* using these repositories voluntarily.

The University of California conducted a survey of its faculty in late 2006, receiving 1,100 responses to questions about attitudes and behaviour towards issues in scholarly publishing and scholarly communication (The University of California Office of Scholarly Communication, 2007). As mentioned earlier, this work found that faculty were having to focus on conventional publishing activities that support their professional advancement and tenure applications. This supports my argument of the institutional/disciplinary divide, however this study was primarily quantitative, and analysed results according to academic standing rather than disciplines.

Two small qualitative studies have confirmed aspects of this research. The study undertaken at Cornell University mentioned above (Davis & Connolly, 2007) specifically sought to identify the reasons behind the low uptake of its repository. The study was based on interviews with eleven faculty members in the sciences, social sciences and humanities, at the one institution. One of the conclusions was that faculty were more inclined to use subject-based repositories over institutional ones. The second study looked at 21 researchers at Cranfield University. It supported previous research in finding there was a perception in some of the academic community that open access journals are not counted for impact factors. This study came to the conclusion that there was a need to attempt to embed the repository into the research process (S. Watson, 2007).

There have been some recent indications in the literature that an in-depth study of how disciplinary publishing differences have an impact on the uptake of new publishing options would be timely. An electronic survey of 900 PhD students and faculty across all Finnish universities in 2004 looking at ejournal use patterns found that "research-culture aspects - especially group membership and across-fields scattering - have a significant influence on ejournal use patterns" (Talja, Vakkari, Fry, & Wouters, 2007, p1683). This study used the theory of the social and intellectual organization of academic fields to analyse their findings and concluded "that no single variable, such as availability or discipline, or a single set of variables, such as collaborative culture interdisciplinarity, and concentration of communication channels, explains all differences". This finding supports the argument made in this thesis that the question of how publishing behaviours differ between disciplines is a complex issue in need of further investigation.

An Australian study, that was published as this research was being written up, was conducted by the OAK Law Project, which has an emphasis on copyright and other legal issues (Austin, Heffernan, & David, 2008). While the survey asked about publishing behaviour and attitudes, the focus of this study was to develop model publishing

agreements and practical training materials for academic authors and publishers. It was not focused on the reasons why there has been a low uptake of open access dissemination options. This online study was limited by a low response rate, and the only disciplinary comparisons made were between the 'arts and social sciences' and 'science and technology'. This is another study which demonstrates the disconnect between support for open access and the actual uptake of it. In the study, 61% of respondents 'strongly agree' and 29% 'somewhat agree' that open access increases accessibility to research outputs, this is in keeping with other international studies. However, the study showed, once again, that there is little translation of this enthusiasm for open access into action. Only 29% of respondents said they consider whether a journal is open access is 'fairly', 'very' or 'extremely' important when deciding where to publish, and the figure was 31% for whether a journal supports deposit to an institutional repository. While there are some small overlaps with my research in findings about awareness of copyright, this study is effectively another that emphasises the need to obtain a deeper understanding of why there is the low researcher engagement with open access.

Two other PhD research projects looking into open access issues are underway in Australia in tandem with this work. To date, the published information about these studies is limited. The early findings of one research project described in a publication are referred to by the author as a "blunt instrument, designed to give an overall picture that cannot be obtained in other ways, and to identify particular areas of interest to be investigated in more detail at a later stage" (Kennan, 2007, p. 140). The empirical component of the other consists of an online survey attempting to "develop understanding of the current publication patterns of Australian academics"(Mercieca, 2008, p. 1). This study found that of the 245 respondents, 58% indicated they were unsure of whether they could submit a paper they had authored to a repository, which supports the general findings from the interviews conducted for this thesis, that researchers are unclear about their copyright arrangements and that providing administration assistance would increase repository uptake. Like most of the other research in this field, Mercieca's research does not appear to be exploring the 'why', instead focusing on the 'what' of academic publishing behaviour. While there is bound to be a small amount of overlap of findings between these two research projects and mine, together they are likely to be able to offer a richer description of the Australian open access landscape.

Finally, one recent study recognises that the key to uptake of institutional repositories is a sociocultural one, and bases its findings on ethnographic observations and interviews with 25 scholars at Cornell University about their scholarly practices and interdisciplinary

collaboration patterns (Rieger, 2008). This research draws similar conclusions to the research in this thesis, in relation to the critical importance of cultural norms but the study is more limited in scope. Reiger concludes that:

> Through analysis of sociocultural factors based on social theories, we can attain a better understanding of how information and communications technologies should be designed and implemented, and improve promotional activities to encourage their appropriation. As shown in the case of IR implementation, change is an outcome of social evolution as well as technical innovation.

This argument concurs with mine, and the research described in this thesis goes some way to achieving that 'better understanding'.

Summary

In answering the question "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?", this research has uncovered several answers: the reward structure, the institutional/disciplinary divide and disciplinary differences, particularly in their information seeking behaviour. The findings show that traditional arguments for open access are ineffective and information-seeking behaviour demonstrates how disciplinary differences affect researcher's interaction with technology. This thesis adds considerable weight to the body of evidence that the current reward system for promotion and funding requires researchers to publish in certain ways, inextricably linked to the traditional publishing system which was established in the pre-digital era. Any large-scale move towards open access dissemination options requires a seismic shift in the way academic output is measured. While having work openly accessible increases an academic's exposure, unless alternative internet-based forms of metrics are adopted, the open access option will not directly appeal to researchers.

This research has introduced the second issue, that of the institutional/disciplinary divide which is crucial to a widespread embrace of new publishing and communication options, yet has not had much focus in the open access debate. To date, governments, funding bodies and institutions have embraced the concepts of open access, written mandates and statements and developed tools to try and encourage open access, but have not considered the different needs of the ultimate user, the academic population. Until governments, and particularly university administrations, recognise the need to consider the discipline and the need to consider the individual and respond to these needs in the way that QUT is trying to with the economists, and until there is a realisation that different disciplines may require radically different approaches, there will not be a large-scale adoption by

individual researchers of the current open access tools. This leads us to the last issue, disciplinary differences in scholarly communication practices. It is the issue of disciplinary differences which is crucial to any widespread uptake of open access dissemination options. Disciplinary scholarly communication practices are deeply embedded in researchers' work lives and any change to them such as introducing open access will need to consider and incorporate these practices.

This discussion has focused on repositories because this is a route to open access which is available to most researchers without compromising their choice of publication outlet. The discussion is focused further on institutional repositories because very few subject-based repositories have been developed by or are managed by organisations in Australia and Australia is unusual in having a large percentage of institutions with repositories. However unless there is a disciplinary habit of sharing information in this manner, this method of achieving open access offers little incentive to the individual academic. In particular institutional repositories do not obviously assist the academic in their daily work. Either institutional repositories need to adapt dramatically to offer work practice benefits or the broader academic population will only use them under duress, which is not the situation envisaged by open access advocates. Indeed, it was recently mooted that the fact institutions must mandate researchers to deposit into repositories indicates that institutional repositories fail to meet the needs of the academic population (Powell, 2008). The alternative is for communities to develop their own subject-based repositories, a development that again is likely to be highly dependent on communication norms in different disciplines.

Considering this situation, it could be construed that the barriers to open access uptake are insurmountable, and any push towards open access is destined to fail, but this is not necessarily the case. Government and funding bodies worldwide are implementing mandates to ensure that research output will be placed in repositories, and repositories are likely to function as they are for a few years to come. However, parallel to this, user generated media will continue to develop, as will online trust mechanisms. In some disciplines such as Computer Science these may replace the institutional repositories as an open access outlet. Future online 'holdings' of research output may consist of a mixture of tools, and open access may be a side effect rather than the focus of them.

Chapter 9 – Conclusion

The question this thesis has asked is, "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?". I have examined the inconsistency between support for open access at the government and institutional level combined with the proclaimed support demonstrated by research into the academic population, and the reality of the low uptake of open access dissemination options. Determining the answer has required an analysis of the broader issues of scholarly publishing and its role in scholarly communication as any move to open access represents a fundamental change to this process, on conceptual, practical and economic levels.

This research has focussed on the individual academic as the key to any widespread change to scholarly publishing. By speaking to individuals from different disciplines, it was possible to separate 'attitudes' from 'behaviours'. This is important as many studies have shown self-professed attitudes frequently do not translate into behaviours supporting those attitudes. Like respondents in other studies, the academic population in this research generally supported the concept of open access to scholarly output, however, their willingness to act upon this and engage with the publishing options required to make their own work available was often limited.

This work began with the premise that a general lack of awareness of open access amongst the academic community is a small factor in the population's lack of engagement with open access dissemination options, and that while open access potentially offers a modern and effective way to manage knowledge, the concept of open access itself is not the reason why scholars are not engaging with it. Rather, it is the way researchers engage with the broader scholarly publication system that is preventing widespread change amongst this population. Certainly the empirical work demonstrated a general lack of awareness of open access as a concept amongst the interviewees. In addition there was little awareness of the availability of an institutional repository not just amongst the UNSW academic population whose repository was still to be implemented, but also amongst the ANU population who had had a repository available to them for approximately six years. However this lack of awareness is only a small part of the problem.

The supplementary questions this thesis has addressed included: 'why are researchers not engaging with open access?' and 'why are researchers choosing to support traditional publishing systems when technology offers an efficient and more immediate way of achieving the functions of the system?'. The answer to both questions is tied into the main research question, and is inextricably linked to the reward system in academia. The challenges the scholarly communication system is currently facing are partly because it was developed in an era before the advent of modern technologies. Issues such as delays to publication and increased refereeing loads, while acknowledged by the academic population, are not compelling enough to change researcher behaviour. The arguments by open access advocates that open access increases dissemination of research making research more equitable (the public good argument), and that copyright remains with the researcher under the open access model are largely falling on deaf ears in the academic community. If institutions were to introduce any changes to copyright rules, such as introducing licences that can be attached to publisher agreements to allow articles to be placed in repositories, such as those developed by MIT (2007) then a comprehensive education program will need to accompany such a move.

Surprisingly, even the argument that making research openly accessible increases the impact of the work (the increased visibility argument) is not resonating with the academic population. The findings demonstrate that a central reason for this is the reward system in academia, which is inextricably linked to the traditional publishing system, supporting the second of the three premises with which the research began.

The third premise at the beginning of this research was that an important element in the uptake of open access is the individual researcher. The research confirmed this perspective, and also showed that part of the reason that there has been a slow uptake of open access is because the publishing options that are available as open access do not necessarily meet the needs of the academic population. In an unexpected way this has proved to be the key to answering the research question. The introduction stated that this research intended to reveal whether the lack of engagement with open access has a common element to it across different academic groups, within particular academic groups, or if it is an individual decision. What the findings showed was that there are strong ties within disciplines and that the differences between disciplines is a pivotal factor in the engagement or otherwise with open access options. This has not previously been identified in the open access literature.

This research has shown that the most important factor in the researchers' lack of engagement with open access is disciplinary differences in scholarly communication practices. These differences underlie the institutional/disciplinary divide, where an individual researcher is caught between on one hand the reporting requirements of the various institutions to which he/she is aligned, such as funding bodies, the government and the university at which they are housed, and on the other hand the social norms of the discipline to which the researcher belongs. When there is a difference in these requirements, the individual often chooses to publish within their disciplinary requirements for communication, and simply complies with reporting requirements as a matter of necessity. This affects moves to open access when the only open access options available to an individual are those provided by the institution, which may not comply with any disciplinary requirements.

The research asked, in broad terms, "What are the barriers to the uptake of open access scholarly communication in Australia?" The answer is that, counter-intuitively, it is the case that despite stated intentions and even legislation and rules to attempt to encourage open access publication, governments, funding bodies and institutions are in many ways hindering the move to open access. This is because traditional publishing systems are being supported by institutionalised reward structures. Increasingly universities, governments, funding bodies and university ranking systems are relying on metrics counts as an objective measurement of the quality of research.

The wider audience for scholarly articles offered by open access does not necessarily translate into quantifiable 'points' for the researcher in the form of citations. It is clear that open access dissemination options will only tie back into reform of the scholarly communication situation if they reflect the reward system. If there is a change to the way 'success' or 'impact' is measured (such as a count of downloads of material, for example), then the arguments for making material open access will become considerably more compelling for the researcher. As discussed in Chapter 2, there have been many criticisms of the use of the impact factors as a measurement tool (Monastersky, 2005; Seglen, 1997; Steele et al., 2006). Despite these criticisms, there appears to be little incentive on behalf of administrators to move away from the use of impact factors as a measurement tool, and this is causing the researchers to publish in ways that they would not otherwise choose.

Despite some institutions mandating engagement with open access, the vast majority structure their promotion systems and funding streams around the current publishing paradigm. There are increasing moves towards metric-based systems of rewards, witness

the change in the UK from the Research Assessment Exercise to the Research Excellence Framework and the new Excellence in Research Assessment system in Australia. In addition, the Shanghai Jiao Tong University ranking[lv] moved the Thomson Reuters' Journal Citation Reports' (JCR) impact factor to the chief quantitative measure of the quality of research, and the Times Higher Education World University Rankings[lvi] is using Elsevier's Scopus to determine their list. These trends simply serve to cement the role of the traditional journal publication in the academic career trajectory. The result is an homogenisation of the required academic output for assessment.

This increased homogenisation runs in a polar direction to widening disciplinary differences. Disciplines have their own practice, communication and social norms and these differences are increasing depending on the uptake of technology within the discipline. Administrative homogenisation is stifling change to the scholarly communication system, including any moves towards open access. There is no allowance for differences such as journal publications suiting some disciplinary communication better than others, or that there are countless other, more efficient ways to communicate within the discipline, or that the most appropriate journal publications for a particular discipline might not appear on the Thomson Reuter's 'core journals' list. This is another example of the institutional/disciplinary divide. While institutions are forcing researchers into accounting for themselves in this way, the current formal scholarly publication system will remain fundamentally unchanged.

This research focussed on repositories rather than open access journals because repositories are an option available to most researchers in Australia, and paid special attention to institutional repositories. It began with the concept that scholarly communication is in a period of transition, that the changes currently being seen are merely steps on the path to a complete overhaul of the scholarly communication system. One of the conduits of change has been the development and proliferation of repositories around the world.

Diffusion of Innovations literature holds many clues to why institutional repository uptake has been limited to date. Institutional repositories are what Rogers (2003`) describes as 'centralised' systems, where the decisions about the innovation itself and the diffusion of the innovation are imposed from an external source – the university administration. In a study that looked at how different disciplines were using the (then) new technologies of computer networks, Walsh and Bayma (1996) concluded that the "form of technology introduced is highly dependent on the context into which the new technology is

embedded" (p. 693). When there is input from a discipline, the final form of an innovation will emerge from an interaction between structural and institutional factors. But in order for this interaction to occur, the institution needs to observe and incorporate the structure of the disciplines. Institutional repositories are predominantly built on open source software. This ability to develop repositories 'out of the box' has provided universities with the basic functions for depositing and retrieving articles, but because the 'form' of the technology has been predetermined, it does not necessarily suit all disciplines.

Do repositories offer an answer to the problems inherent in the scholarly communication system today? Funding bodies have recognised that there is better 'value for money' if the work is publicly available, and some have seized upon this open access option by mandating that research output goes into repositories. Institutional repositories often serve two functions for institutions, one is to have a 'showcase' of academic output, and they can also serve as an efficient reporting tool for funding. This emphasis on institutional purpose is one of the reasons why repositories as they currently stand are not meeting researchers' needs.

Ultimately the key to open access uptake is the individual academic. Disciplinary, or subject-based, repositories have enjoyed success, not least because they were developed by members of the discipline using them so they have features which suit that group, but also because their use is part of the behavioural norm within the discipline. These repositories may not have open access as a goal in the wider sense because the target audience is still other researchers in their small field, but open access has occurred as a side effect. This situation is reflected in the behaviour of computer scientists who are effectively practising open access by making their work available on their own websites. This is not for the benefit of the general public, or their institution, it is simply so they can communicate more effectively.

The more successful examples of widespread open access have evolved organically out of the requirements of specific disciplines. It is quite possible that some disciplines will never see the need for a change to the current scholarly system. Certainly some (generally older) researchers who did not have a digital undergraduate experience are less likely to consider a need for change. As younger people move into these disciplines and bring with them their online social behaviours, there may be a move towards new ways of interacting. As suggested at the beginning of this research, the speed of information production and reticulation within a discipline is an important factor in the perception of the necessity and urgency for change amongst the participants as this reflects the level of

'urbanisation' of that discipline, the speed at which the discipline moves depending on the number of people working on a given problem at the same time.

It is possible that repositories are not the long-term solution to address problems in the scholarly communication system for several reasons. One is they do not address the wider problem of the publisher's stranglehold on the scholarly communication system. Instead they work alongside it, a compromise that satisfies calls by open access supporters without threatening the income stream of publishers. Secondly, many repositories world-wide do not have ongoing funding, rather they are relying on start-up or special library funding. Repository sustainability, and not just the digital sustainability of what is in them, is a serious issue.

In summary, the answers to the question "How are the communication practices between researchers affecting the uptake of open access scholarly dissemination in Australia?" are partially, a lack of understanding of open access, and the reward system requiring an adherence to traditional publishing outlets. Critically, however, the institutional/disciplinary divide is causing serious problems for many researchers being forced to publish in certain ways to fulfil reporting requirements that run counter to their disciplinary communication preferences, and the vehicles currently available for open access dissemination are not necessarily ideal for the way researchers work and communicate. The way these are being introduced into the academic community is ineffective at best.

Implications

The findings of this thesis imply that attempts to engage researchers with open access using institutional repositories are unlikely to be broadly successful. Disciplinary differences offer a clue to the future of open access. Some academic disciplines have already tackled open access head on, and come up with their own solutions that fit their disciplinary interaction requirements. Others have not yet determined whether there is a problem with their scholarly communication systems and for some disciplines there will not be. A likely scenario is that open access will be a side effect emerging from the changes that different disciplines introduce into their own communication processes. These changes will not be homogenous across all of academia.

Changes to scholarly communication might not happen in the way publishers, or institutions would like, they may not happen as fast as some open access advocates would like, and they might not take the form many people have advocated. Nonetheless given

societal and governmental trends, changes to the scholarly communication system are underway but to be widely embraced they will have to organically incorporate the reward systems and the work and communication practices of the individual researcher.

Recommendations

Institutional repositories are not immediately appealing to researchers. Some respondents described the availability of subject-based repositories, or alternatives such as personal websites, as a reason for not using their institutional repository. Other respondents described not using an institution-based repository because of career mobility. In Australia, many researchers are employed in contract positions rather than tenure positions, and early career researchers in particular tend to move institutions. The interviewees indicated there appears to be little recognition of this situation on behalf of the administrators and policy makers. If institutions do not consider how scholarly fields adopt and shape technology, the risk is that time and energy will be focused on institutional projects that ultimately fail.

If repositories are to be the solution for widespread open access they must mirror the information-seeking behaviour of the communities they serve. However, while institutional repositories may currently work counter to the information management needs of the individual academic, they have the potential to provide tools to make communication easier, assist information-seeking and sharing information more efficient. An adaptation of a repository to fulfil some or all of these requirements, would make it more attractive to the academic end-user. Applying diffusion theory to a consideration of different disciplinary scholarly communication practices when developing an institutional repository advocacy program would markedly increase the chance of the program's success.

One way to address the barriers to the uptake of open access scholarly communication could be a move away from single institutional repositories, which have, by default, an emphasis on the institutional output, to a subject-focused system. It was this approach that Tom Cochrane from QUT originally took, he explained in interview: "I was convinced the only way there would be progress would be the disciplines would have to follow the example of the high energy physics people at Los Alamos. And they didn't" (Cochrane, 2007). In the absence of a subject-based repository of a particular discipline, it would be ideal for the institutional repository to adopt some of the processes already in place in different disciplines to ensure a beneficial situation for both parties – the institution and the individual.

Because this research has, by necessity, looked at a certain period of change in the scholarly communication landscape, it is appropriate to describe possible future areas of research that have arisen from this work. The increasing uptake of user-generated media systems such as wikis and blogs represents a new and somewhat unexpected engagement with the Internet by researchers in certain disciplines. It is likely that these new media systems will offer publishing alternatives that have yet to be developed. Scholarly publishing, while slower to adopt new technologies because of the formality associated with reward and reporting, will nevertheless reflect changes in scholarly communication. Following technology and disciplinary difference trends to determine how these new uses of media are changing scholarly communication would be an interesting avenue of research.

Scholarly communication is changing, and new technologies are allowing these changes to become increasingly discipline specific. Academia is not homogenous, so open access dissemination options cannot afford to be either. It will be essential to incorporate consideration of disciplinary differences in any design and implementation of open access dissemination outlets for them to be widely embraced by the scholarly community.

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Appendices

Appendix 1 – Consent form

ID Number:

I _____agree to be interviewed by Danny Kingsley regarding past and future publication of my research. I have read and understood the following information:

That the aims, methods, and anticipated benefits, and possible risks/hazards of the research study, have been explained to me

My interview will contribute to research about changes in publishing patterns by Australian scientists

My participation is voluntary and I am free to withdraw my consent at any time during the study, in which event my participation in the research study will immediately cease and any information obtained from me will not be used

Aggregated results will be used for research purposes and will contribute to a PhD thesis and possible subsequent journal articles

The names and job titles of interviewees will be withheld in all published work

All raw data from interviews will be securely stored in locked filing cabinets and on a password protected computer, which only Danny Kingsley has access to, so far as the law allows

Further questions about the research may be directed to:

Danny Kingsley, Centre of Public Awareness of Science

Physics Link Building 38a, Australian National University, ACT 0200

ph: +612 6125 6147 danny.kingsley@anu.edu.au

Concerns about the research may be directed to the Human Research Ethics Committee care of,

Human Ethics Officer, Research Services Office

Chancelry 10B, Australian National University, ACT 0200

ph: +612 6125 7945

Human.Ethics.Officer@anu.edu.au

Signed:_____ Date:_____

Phone no:_____ Email:_____

Appendix 2 – Processes undertaken to obtain interviews

University of New South Wales (UNSW) Sociology/Anthropology

Sociology/Anthropology at UNSW is a small department. It is worth noting that at the time of interviews the department was undergoing radical change and was about to be absorbed into another department at UNSW. I sent a letter to the head of the UNSW School of Sociology and Anthropology, Dr Diana Olsberg, on 29 August 2006, informing her of my intended study and offering to meet for a discussion. In preparation for the meeting I looked up the staff list on the website in September 2006[21] which had 13 academic staff, three visiting fellows and three visiting professors (a total of 19 people). At our meeting on 11 September, Dr Olsberg informed me that one person was on leave, another on sabbatical, two were overseas, two were no longer part of the department, and another was about to leave for the University of Sydney. This left 12 staff members (excluding the head of school). The head of school agreed to send an email on my behalf the following week to the staff.

On 28th September, I followed this up with an email inviting the 12 staff members to participate. Three replied to say they were unable to participate, and of the four from which I received no reply, two were visiting professors and the other two were regular staff. In total I interviewed five people, representing 42% of the department.

UNSW Chemistry

Chemistry is the oldest continuous school at UNSW and previously at the Technical College, starting in 1879. An observation made by the Chemistry head of department was that all leaders at UNSW have a Chemistry background, including the current DVC. According to sci-bytes[lvii], Chemistry at UNSW has the highest impact of the Chemistry departments in Australia. In 2000-2004 it published 829 papers with 5.03 citations per paper, ANU comes fourth after Melbourne and Monash with 838 papers with average citations of 4.46.

I sent a letter to the head of the UNSW School of Chemistry, Professor Robert Lamb, on 29 August 2006, informing him of my intended study and offering to meet for a discussion. He agreed to meet on 11 September 2006. In preparation for the meeting I looked up the

[21] The printout I have from the web page (circa September 2006) did not have the url on the bottom, and the webpage appears to have been updated since then.

UNSW Chemistry staff web pages[lviii] in September 2006. There were 38 people listed, 21 academic staff, four research staff, nine emeritus professors and four honorary visiting fellows. During the meeting I had with the head of school he mentioned that the department used to have 50 people and now had 18 researchers, indicating the web staff pages may have been out of date.

There was some confusion over the selection of people to interview in this department. When I met with Professor Lamb the Chemistry department was about to move into a newly completed building. Because of this, I agreed with him that it would be prudent to allow time for the move before I approached the Chemistry staff members. Unfortunately there was a miscommunication between us. As discussed, on 12 October 2006, I sent Professor Lamb an email that he was to distribute to his staff, with two attachments explaining my work, indicating that I would contact them within a week. I did not hear back and had to email him again a few days later to ensure he had sent the emails out. On 17 October I received a reply email saying that he had 'sent the information out last week and gave them a week to reply'.

There was a delay because Professor Lamb went overseas and the school administrator changed. I eventually spoke to his new assistant, explaining that all I needed was the list of people he had sent the email to. The following day Professor Lamb called me and asked how many people I wanted and I indicated six people would be ideal. His assistant then emailed me a list of six names on 28 November, who are 'aware you will be calling them in regard to your study'. I sent an email to all six on the 28 November inviting them to participate. All did so, but it is important to note that this is not a random or even self-selecting sample, it is a sample chosen on my behalf by the head of school and I am unaware of the reasoning behind his choice. However, these six people do represent a range of ages and types of chemistry research so it acts as a broad sample. Excluding the Emeritus and Honorary Visiting fellows, it represents 24% of the department.

Another issue of note is that while this was only mentioned by two people interviewed, every staff member I spoke to has had to physically sort though all the accumulated paper and materials they had in their old offices in preparation for moving. Whether this means the way they have organised their working patterns changed I cannot tell.

UNSW Computer Science

I sent a letter I sent a letter to the head of the UNSW School of Computer Science and Engineering on 29 August 2006, informing him of my intended study and offering to meet

for a discussion. In a brief telephone conversation he informed me he was interstate when I intended to go to UNSW. I sent a subsequent email attempting to meet a second time on 17 October and a third on 1 December 2006. I discovered on a visit to UNSW when I spoke to the department administrator that the head of school was on leave and was given the name of the acting head. I sent an email to the acting head on 15 December. Having has no reply I decided to approach the staff directly.

The list of Computer Science academic staff was taken from the CSE website[lix] on 2 January 2007. The total number of people on the list was 94, but some of these were not contacted for interview. I excluded the previous head of department and acting head of department because I had contacted them both initially and had no reply. A few people were on leave (3), others were from an external office and/or didn't have contact details (4), some websites stated 'person not found' (6). In addition, those conjoint researchers who are affiliated with the Australian Technology Park (8) and NICTA (16) were also excluded from the invitation. In total 39 people were excluded from invitation.

This meant that the invitation to participate was sent to 55 people on 2 January 2007. Five people emailed to say they were not interested and four sent automatic emails saying they were away. There were 36 no responses (65%). Interviews were conducted with nine people between 10 January and 12 February (16% of the total).

Australian National University (ANU) Sociology

The Sociologists at ANU are part of the School of Social Sciences in the Faculty of Arts. They are collected with History, Political Science and International Relations. Anthropology is a large part of ANU, and there is a School of Archaeology and Anthropology, but Anthropologists are also working in the Centre for Aboriginal Economic Policy Research, the Centre for Cross Cultural Research, RSPAS, and Gender Relations.

The Faculty of Arts website lists 'Academic Staff in the School of Social Sciences' and splits them into Teaching Staff and Adjunct Appointments. Of the 31 teaching staff and 8 adjunct appointments listed on the website on 29 January 2007, six sociologists were listed as teaching staff, and one Adjunct Professor.

I sent a letter to the head of the ANU School of Social Sciences on 5 February 2007, informing him of my intended study and offering to meet for a discussion. He replied on 6 February and we agreed to meet on 22 February 2007. Meanwhile, I sent invitations to all six teaching staff on 9 February 2007. Three people responded agreeing to be interviewed

and two replied asking that I contact them again in March (after session one had begun). Because the numbers were so small in this instance I did not interview the head of department separately, but included him in the sample group. He was the third person interviewed and he suggested I contact those who had not replied to date saying that my work had his endorsement. This resulted in two further interviews. Only one of the teaching staff did not reply at all. I also sent an email to the adjunct professor on 20 February 2007 to which there was no reply.

In total six interviews were conducted out of the possible eight, representing 75% of the total.

ANU Chemistry

The ANU Chemistry researchers are housed in both the Research School of Chemistry and the Department of Chemistry.

The Research School of Chemistry

The Research School of Chemistry website[lx] on 29 January 2007 listed 22 Group Leaders (which included the Dean, Deputy Dean and Associate Dean (Students)), 8 Visiting Fellows, a Laboratory Manager and an Academic Secretary.

I wrote a letter to the Dean on the 7 February 2007 requesting an initial interview. Three follow up phone calls to the administrative staff indicated that the Dean was not interested in making a time to speak, so on 9 March, I sent out 21 emails (excluding the Dean) inviting Group Leaders to participate. Two staff emailed to say they had moved to new institutions, another was on maternity leave. This brought the possible number of interviewees down to 18. One staff member emailed to decline to be interviewed. I did not hear from 11 people, and interviewed six, representing 33% of the possible interviewees.

The Department of Chemistry

The Department of Chemistry at ANU listed 10 Academic Staff on its website[lxi] on 29 January 2007. There were no email addresses for the first year coordinator, an ARC fellow and a research associate so they were excluded. Seven emails were sent out to the remaining people on the list on 9 March 2007. Another person whose email bounced back was also excluded. One person responded agreeing to an interview, representing 10% of the total possible interviewees, and 16% of the people able to be contacted.

ANU Computer Science

The ANU has both a Computer Science Laboratory and a Department of Computer Science (housed in the Faculty of Engineering and Information Technology).

Department of Computer Science

I sent a letter to the head of the Department of Computer Science, Professor Chris Johnson, on 5 February and met with him on 15 February 2007. The staff list on the Department of Computer Science website as at 29 January 2007 listed 27 Academic Staff and 13 Visiting Fellows. In discussion with the head of department it transpired that five academic staff members were industrial (non-research) staff members, and four staff members were either on long service leave or had left the department. One had retired and become a visiting fellow. I also excluded one staff member because I had worked with him at the Australian Partnership for Sustainable Repositories (APSR) on the ANU campus so not only is there a personal relationship, but given the nature of the work he undertakes for APSR, he is not representative of the general academic population in terms of his understanding of the issues. This meant that invitations were sent to 15 staff members on the 22 February 2007 (the head of department was not invited to participate).

By the 2 March, two people had replied to say they were not interested, one had offered to speak to me, but given that she had no publications we agreed not to go ahead, and six had agreed to be interviewed, representing 40% of those invited.

It should be noted that the interviews were conducted between 1st and 9th March 2007. On 27 February the Australian National University was badly damaged by a severe thunderstorm and hail damage was recorded in most of the buildings on campus. The university was closed to staff and students on 28th Feb, and to students on the 1st and 2nd March. The Computer Science building was one of the worst affected with two large skylights collapsing causing widespread flooding and electrical damage. This meant my interviews were conducted under unusual circumstances. One person met me in the building in a darkened room (due to the electricity being cut off) which was not otherwise affected. Another postponed the interview, and a third came to my office to be interviewed.

Computer Science Laboratory

The Computer Science Laboratory (CSL) webpage listed 32 entries of academic and adjunct staff on the 9 March 2007. Eliminating the 21 NICTA researchers, the Federation

Fellow and the PhD student, meant invitations were sent to nine staff members on 9 March 2007 (this included one person to whom an invite had already been sent on the Department of Computer Science list.) Five people replied agreeing to an interview. Unfortunately one withdrew due to an injury sustained on the morning of the scheduled interview, so four people were interviewed from the Computer Sciences Laboratory.

Appendix 3 - Reasoning behind the interview questions

Background career information

Firstly, please give me an indication of the spilt of your time between teaching, research and administration.

This question as mentioned in the Research Design chapter, was used as an 'ice breaker'. Initially I intended to ask questions about their career based on my pre-reading of their CVs. This idea was abandoned very early as the information coming from their CVs was often patchy. Many people sent through a publication list only (which was what I had requested) which was of limited use as a conversation starter. Many researchers did not have a home page either of their own or generated by the university. Asking about their time allocation, despite the question's non-functional purpose, proved to be useful.

Please briefly describe the research you are currently undertaking – what form does that research take (interviews, observation, experiments, computer work).

There was a risk in this question that the interviewee would suddenly launch into a detailed complex description of their science, and indeed some early interviewees did do this. I was forced to use my skills as a science journalist to turn them around back to the point at hand. I adapted this question slightly as time went on, to ask specifically about the mechanics of their work, such as do they work in the laboratory, or in front of a computer or spend time in discussion. The answers to this question were sometimes surprising. More interviewees than initially suspected work on a whiteboard or with 'paper and pencil' as they described it. Again this is general background information.

Researching behaviour

How do you keep up with what is happening in your discipline?

This was the first of the 'real' questions in my list. I sometimes specifically asked 'how do you keep up with the literature?'. This question elicits information about the participant's information-seeking behaviour. As the interviews progressed and I realised that this was an important aspect of the information I was receiving, I asked some supplementary questions if certain information was not given in answer to this broad question. If needed I would make the distinction between searching for information for a specific article or research project, and general reading to keep up with the literature. In the later interviews I also asked for detail about which electronic tools they used to do this searching if they had not already mentioned it.

How do you decide if an article is worth reading?

Initially this question was attempting to establish what value judgements were being made by the researcher about the journal, the author or other tacit assumptions. While it did not succeed in this endeavour, the question gave insight as to the process researchers go through when skimming the literature.

Do you ever hit barriers when collecting information?

This question addresses one of the issues often put forward by open access advocates, that research is being stymied because researchers are unable to have access to the literature. This question is trying to establish whether researchers themselves experience barriers and whether they consider this to be an issue.

Are you satisfied with your current access to the literature?

This follows directly from the last question and was often already answered by the answer to the previous question. I often framed it as 'I take it from your answer that it would be fair to say you are satisfied with your access to the literature?'.

What changes in the past 10 years have you noticed in the way you search and your ability to find things?

This question was an attempt to determine the level of change the internet has brought to the information-seeking process. The answers were all similar in terms of the mechanics of what has changed, but the interesting detail was in the way the interviewee discussed what this meant to them and their research.

Do you think the ease of access to a paper affects the choice of papers you use for research?

OR:

Does a barrier mean you change what you are looking for (finding an article that is easy to get hold of that says essentially the same thing?)

These two questions are closely related and I generally asked one or the other. Often the participant had already given an answer to this question indirectly when answering the barrier question. The question intends to elicit the level of inconvenience experienced when a researcher is unable to obtain the literature they need.

How do you go about obtaining copies of the articles you need?

This question was only asked directly if the answer had not already been given. Initially, when devising the questions, I had assumed that researcher would use techniques such as approaching the authors directly, using inter-library loans, or contacting a friend at a

different institution who did have access to the material. As the Results Chapter will discuss, very few of the participants used any of these options. This demonstrates clearly one of the risks in trying to develop a written survey that anticipates the answers the interviewees will give (discussed in the *Qualitative or Quantitative?* section in the Research Design chapter).

Do you send out copies of your work to people?
Again this is a related question to the previous one. It was important to ask this however, because even if participants did not themselves approach others for copies of their work, it was possible that they were being approached by other researchers. This question revealed some insights into how these types of negotiations have changed over the past 10 years.

What proportion of your information would come from published literature as opposed to grey literature?
I did not always ask this question. As discussed above the grey literature issue was less important than other issues, and if we had already spent a considerable time on this first section of the interview, I jumped straight on. It became clear too, within the first few interviews that this was a discipline–specific question. I did not ask it in my later sociology interviews. Chemists, I discovered have what I would have defined as 'grey literature' available to them as attachments to some papers – which makes the question somewhat nonsensical. The computer scientists, however did have some interesting things to say on this topic.

Publishing behaviour

Why do you publish your work?
This question, discussed in Chapter 4, was very important. It is trying to establish the academic's motivations for publication – and which of these motivations is the most important. As I suspected before interviewing, issues such as status within the academic community, the necessity for promotion and personal satisfaction were often given as reasons. But it was the way the interviewer then gave opinion on these matters that became really valuable. This simple question often went most of the way to answering several of the subsequent planned questions. It was usually at this point that the interview started veering off course into whatever area the interviewee flagged as an issue.

Please describe any formal instruction you were given about the publishing process. (If there was none, please describe how you found out what you know)

As discussed in Chapter 7, this question was a 'sleeper' question. It was initially devised to try and establish how much of an awareness researchers had about both the logistics of publishing and the implications of publishing.

Are you involved in any formal or informal mentoring or training process for young researchers to 'show them the publishing ropes'?

This was a natural follow-on question from the previous one, added after the first couple of interviews. It attempts to establish if the way young researchers are being mentored has changed over the last few years/decades. It also is attempting to establish if a researcher had a particularly good or bad experience whether they have chosen to repeat that or deliberately work differently.

Could you explain your choice of the journals you have published in?

This is a variant on a question that often appears in written surveys about publishing. Rather than offer a finite list, the question is asking the interviewee to describe in their own words their thinking processes. I was hoping for more obtuse answers than standard responses such as 'prestige of the journal', and this approach meant that some respondents talked about issues such as formatting or having a relationship with the journal editors.

Have you ever been approached by a journal to publish your work?

This question was an attempt to gain an insight into how journals operate. As discussed above, I had elected not to direct my research at publishers, but this does not mean that an understanding of techniques used by publishers is not vital to the research. In asking this question I was trying to establish what level of material submitted to journals by authors is 'cold' rather than invited. This would give a truer indication of the rejection levels of journals.

On average, how often are you accepted by the first journal to which you submit?

This is a question about rejection rates, but as the term 'rejection' is potentially offensive, and the expression 'rejection rates' may be unfamiliar, it is more effective to ask about acceptance (and therefore infer rejection). This question is also trying to ascertain how good authors are at estimating the quality of their papers – if they are always accepted, it could be because they are aiming too 'low' with their journal choice, or because they are exceptionally good at judging their own work. The latter is more likely if they publish in a wide variety of journals.

Have you ever submitted to more than two journals (and if so what was the overall time to publication?)

This continues on from the last question – if a paper is rejected by a journal it is common for the author to resubmit to a different journal and to keep doing so until it is accepted (as I am experiencing myself, as discussed in Chapter 4. I often asked a supplementary question after this which was "so what is your 'hit rate' of journal submissions?"

On average, what has been the period of time between submission and publication – do you have an opinion on that?

This question touches on one of the issues in modern scholarly communication, that journal publication is very slow in a time of instant communication. This is put forward by advocates as one reason for a move to open access dissemination. By asking the interviewee's opinion about this, the question hopes to determine whether researchers themselves perceive the delay in publication as a problem for their research.

Reward processes

What is your understanding of the relationship between your publication output and funding?

As Chapter 2 indicated, the reward systems currently in place for publishing provide a strong disincentive for researchers to change the publishing practices to embrace open access. But in order for this assumption to be true, it is necessary for the researchers to be aware of the connection between publication and reward, which is what this question is trying to establish. In many cases this question was answered by the interviewee when answering 'why do you publish' or in discussing their introduction into the journal publication process.

How would you feel about the ARC allocating funds to include Open access publishing or would you rather the money be spent on research applications?

This was a very delicate question, as in some ways it was a leading question. I did not ask it of people who had not given any indication of an understanding of open access, as I would have had to at this early point in the interview, drifted into the open access discussion. In retrospect it was not a particularly useful question.

Do you have an opinion about any changes to reporting requirements by your university/the government?

This was not one of the initial set of questions, but the first set of interviews indicated a level of frustration with reporting requirements that seemed to be worth exploring. The reason for the question is to find out whether researchers consider reporting to be part of their workload or an unwelcome addition to it. It is possible that if researchers perceive reporting requirements to be an imposition, then they may perceive using an institutional repository in the same way.

Again, I only asked this question if the interviewee indicated that they had an awareness of the reporting requirements that were already in place, as otherwise the question would have needed to be prefaced with information about the (then current) Research Quality Framework (RQF). In some instances I gently probed and mentioned the RQF, and if this was familiar to the interviewee then continued with the question.

Copyright

What is your understanding of the copyright status of your academic work?

The issue of publishers requiring ownership of the copyright of published articles is put forward as one of the primary reasons why scholarly communication should move towards open access. While much debate has occurred in open access circles on this issue and certainly amongst law trained advocates, I wanted to know whether the average academic was aware of copyright, and if so, whether they considered the status quo to be acceptable.

This first question about copyright is a gentle probe, without giving any clues as to what I was wanting to know. It allowed the interviewee to be honest about their situation, and if the case was that they did not know (or care), they were able to say so more easily than if I had framed the question "are you aware of who owns the copyright of your published articles?".

Is copyright an issue you consider? Does the copyright status afforded by a journal affect your choice of publication?

I had suspected that copyright was less of an issue amongst the academic population than advocates of open access imply in their discussions, and in many cases this question was answered by the response to the previous question. Those people for whom copyright is unimportant either because they do not care or they choose to ignore it, this question is automatically answered in the negative.

Are you aware of alternatives to traditional copyright (such as Creative Commons licence or copyleft)

I asked this question even of people who had indicated they don't care or know about copyright. As suspected, a general lack of interest or knowledge in this area also translated to no knowledge of alternatives. It was also interesting to know whether people who had shown interest or frustration with copyright issues were aware of alternatives.

Peer review/editorial responsibilities

Have you ever reviewed a paper?

This is an obvious elimination question. If, as was the case with a couple of interviewees, they had not reviewed any papers, there was no need to ask the remainder of this set of questions.

If so how many papers would you review in a year? And how much time would this take?

This question is trying to establish the level of commitment an individual has to reviewing (and to determine if there are differences between disciplines and different stages of an academic's career). The question of time gives clues to how long individual articles take to review. Although I specifically asked about papers, many interviewees included other forms of reviewing when discussing this area (I discuss this at length in the Results Chapter). I did not change my questioning to incorporate this unexpected outcome as it did not have direct bearing on what I was trying to find out.

Are you on an editorial board of any journals? How much time does this take up?

This is an area of peer review I did consider to be related to the research question (unlike some of the other types of review brought up by interviewees such as marking theses). The answers to this question told me that in many cases that being on a board was largely ceremonial. The exception of course was in Computer Science which has conference committees instead, so the question was adapted when speaking to computer scientists. I was trying to determine if being on an editorial board implied an obligation to, or preferential treatment when, submitting to that journal. Sometimes the question had already been answered when the participant had discusses the choice of journal or when talking about their introduction to publishing process.

Is this something you sought or that you were asked to do?

I was hoping to find out if being on an editorial board was considered prestigious. This was a non-question in some ways, and after the first few interviews I stopped asking the question unless it came up in the conversation naturally.

Have you been compensated in any way for that work?

This is an important question because one of the main arguments for open access is that publishers charge large amounts for subscriptions when researchers do all of the actual work associated with producing articles, such as peer review. There have been some claims that publishers provide payment to their academic staff, editors and reviewers (Groves, 2007; Miller, 2004), but I wanted to establish if this was actually happening. Again, many respondents referred to payment for other forms of reviewing as well as reviewing of articles, which was not what I was asking but an interesting aside.

How do you feel about reviewing (is it a positive or a negative task for you and why?)

I was trying to establish with this question whether peer review, which has been the subject of some debate, was generally considered to be problematic. Many of the interviewees had already told me when discussing their information-seeking techniques that reviewing gave them insight into new work, so they thought it was worthwhile. In this cases I asked a supplementary question, "have you had any cases where peer review has not 'worked'?" when the participant could discuss a particular incident that had occurred in the past.

What are your feelings about changing peer review to an open system, in an electronic context for example?

This question was trying to establish the level of resistance researchers may have to one of the fundamental changes to the peer review system which have been proposed by open access advocates. While it was part of the initial set of questions, generally after the first few interviews I stopped asking it, as I was having to explain the question in some depth which led into a debate situation rather than an interview. It appears at the end of this section of questions because it was not central to the research question, and therefore leaving the question out was not a great loss to the data collection.

Open access

As discussed above, this and the next question appear towards the end of the interview. Because it was likely that many people were unfamiliar with the terms, I provided a standard explanation of the terms which was then used as a springboard for any further

discussion on the topic. Even if there was no discussion, I explained the terms anyway, as introducing a new topic to the interviewee without explanation would be rude at best.

Are you familiar with the term 'open access publishing'?
This opening question is simply to establish what level of questioning I could attempt with the interviewee. If they said they were not familiar I gave them the following description:

> Open access is the publication of papers on the internet immediately after peer review, either through an open access journal, or by the author depositing their paper into an institutional repository, to ensure free and timely access for all.

In some cases once they had heard this they indicated that in fact they had heard of the concept, but had forgotten or was never aware of the terminology.

If so, could you describe open access as you understand it?
It is important to ensure that what they consider to be 'open access' is actually what I am thinking of, so that any further conversation on the topic is about the same thing.

Do you have an opinion either in support or against open access?
Often by this point in the conversation this area of discussion had been covered in some way. If not, and open access was a new concept to the participant, this question was asked to give some indication of how open access stood in their opinion.

Have you ever published in an open access journal?
This question was really asking if they had deliberately published in an Open access journal, therefore if it had been a consideration when choosing the journal to submit to. As will be discussed in the Results Chapter, once open access was defined, it transpired that several people had in fact published in open access journals, but more by chance than deliberation. It was the definition which prompted the realisation that this had occurred.

Are you familiar with the 'author-pays' or 'pay-on-submission' model?
Again, this is an elimination question. If they were not, I gave this simple description:

> Instead of charging a subscription fee, open access journals cover costs by charging a fee for each paper accepted. This fee can range between USD500 to USD3000 depending on the journal. There are some journals which offer authors an open access option (for their paper only) with payment, and reduce subscriptions accordingly.

How would you feel about this becoming the standard publishing model for all journals?

I found I did not have to ask this question much, as usually the discussion of the previous question included the response to this one. Like the question about the allocation of grant funding for the pay-on-submission model, this was not an illuminating question unless the interviewee was aware of the open access debate. Otherwise this question tended to become a discussion rather than part of the interview.

Publishing in repositories

What is your understanding of the term 'institutional repository'?

Most of the interviewees who had not heard of open access, (and many who had) were unfamiliar with this term. I suspected this and asked the question as an elimination question. For those who had not heard of institutional repositories, I offered a version of the following explanation:

> An institutional repository is a digital resource maintained (usually by the library) to allow researchers to store their article pre- and post- prints, and digital grey literature. Some repositories also offer digital preservation where non-digital items can be converted and stored electronically

Have you ever deposited any scholarly materials, including pre-or post prints into an institutional repository?

I did not ask this question of anyone who was not aware of institutional repositories.

If not, what about on personal or departmental website?

My pre-interview research already gave me the answer to this question, but I wanted to know if the researcher considered what was publicly available to be a similar concept to a repository. In some cases the answer was illuminating, where the researcher had a website online as part of the department but had no hand in maintaining it. The Computer Science researchers I spoke to had personal websites as a matter of course, and in these cases instead of asking this (to them) pointless question, I asked "would you consider putting what is on your personal website into a repository instead?".

If not why not? Would you consider doing so? What would prevent you from doing this? What would encourage you to do this?

This question is trying to establish the types of modifications that repository managers could make to their repositories to make them more appealing to researchers. This group of questions were not asked verbatim, but generally asked as a group in the discussion on

this topic. As most of the interviewees were hearing about institutional repositories for the first time, I would discuss ways different repositories were set up and the interviewee indicated which parts sounded the most attractive to them.

Have you ever sent out a copy of a pre or post print to colleagues on your own instigation or on request?

This is related in some way to the question about requests for papers in the Researching behaviour set of the questions. It is trying to establish if there is a culture of sharing unpublished material in the discipline, either by using a repository or by other means.

Are you aware of the deposit permission status of the journals you have published in?

This question was included because I suspected that researchers would not be aware of their ability to deposit materials. Generally I did not ask the question. If an interviewee had indicated that they were completely unaware of the copyright status of their work, then the answer to this question was almost inevitably going to be no. Also, in the initial discussion of repositories, those people who were aware of copyright issues usually brought that up as a question at that point.

Grey literature

Does your research generate any supporting data?

This initial question is simply to establish if there is any need to ask the remainder of the questions.

What do you do with supporting data for your research? How do you store it?

This question was tying to establish if the current (or older) method for storage could be helped by using institutional repositories. If so, it could become a potential 'selling point' of repositories for the relevant disciplines. As I discovered in the case of chemistry in particular, most supporting data that is already in electronic form is attached behind a journal article. The remaining supporting data is in lab books and often kept in boxes in the researcher's office. In many cases the interviewee opened a box and showed me the material, which was one benefit of being in their office rather than in a neutral place such as a meeting room.

Have you or would you consider placing it into your institutional repository? If so would you put open access status onto it?

Following from the last question, I asked this to see if the idea sounded appealing. In some cases, such as the situation described above, I did not bother asking, as the supporting data is not 'born-digital', so having to convert it before placing it into a repository would be an unrealistic expectation.

Have you ever received requests for supporting data? If so how often has this occurred and have you provided the data?
This question is trying to establish if there would be any benefit in having the supporting data available in a repository. If it is never requested and never used, the effort associated with putting it into a repository would be wasted.

The interviews all finished with me thanking them for their time and offering to keep them updated with any material I published as a result of the work I had done. Almost without exception, the interviewees asked me to remain in touch.

Appendix 4 – Full transcripts of representative interviews

This appendix contains a complete transcript of one of each type of interview that is, one of each discipline at each university. All identifiers have been omitted. I have not included a complete transcript of the two interviews at QUT, with Paula Callan and Tom Cochrane, because the participants are identified.

Appendix 4a - Full transcript of interview: Chemistry at university A

(7 December 2006)

Interviewer – Basically the general background of what I am trying to research is changing research practices in Australia specifically, I'm interested in the publishing aspect of it, both using publications for one's own research but also publishing results of work as well, so the ingesting and spewing out of papers is the aspect…

The publication technique has changed more than anything.

Interviewer – Yes well you of course in a good position to talk having had an extremely long career. So if we could just briefly speak initially about the type of work that you do, in your case it has probably changed significantly over the period of time that you have been working, but what is the sort of thing that you do?

Well I started working in 1965 and so that's a long period and its almost entirely been synthetic organic chemistry, working on new methodology for synthetic transformation and also working on the design and synthesis new types of molecules. Molecular architecture – you design a structure and you think it would be a good thing to make and you figure out how to make it and see what the properties are. It's almost entirely that. There was also a period where I did some natural products chemistry which was based on isolating some compounds from the endian (?) species of trees and working out structure of those compounds and although that was a fairly short period around 1980, it was a collaborative piece of work. It actually turned out some extraordinarily interesting chemistry, might well be the best thing I have ever done but intrinsically I am a synthetic chemist.

Interviewer - And the work that you do, your publications are always, have always been collaborations haven't they, they tend to…

Oh, they are all, mostly they are me, I mean I have had relatively few real scientific collaborations. But the other names on the papers are the people who do the work.

Interviewer – Could you make that distinction for me? What is the difference between someone doing the work and a scientific collaboration?

If you have graduate students then I would supervise the graduate students they would do the actual experiments. In fact when I started off in 1965 and I only had a couple of graduate students, and I had time I would be back in the lab in the evenings after dinner actually doing experiments with my own hands. But as build up a number of graduate students who need to be doing experiments and need to be looked after, that's when you find you run out of time, you are doing teaching, you are looking after the graduate students you are checking the literature and it becomes more efficient to have them do experiments and you tell them what to do and there are times when they decide themselves but you direct the research and its then done by other people. It is some years since I would have actually done an actual experiment.

Interviewer – OK and by comparison, a scientific collaboration is when your work with somebody on the design of the experiment? Is that what you mean rather than just asking someone to do it?

Yes using the collaboration would mean say at the moment I collaborate with [name] who is interested in a similar area so we have ideas that mesh and I collaborate with [name] and we have ideas that mesh. We can do things that she can't do and she can do things that I can't do but I we can see by putting something together she gets something new and I get something new. So that's an intellectual collaboration and the students do the actual experiments. And that's a fairly standard scientific thing. So when it comes to writing papers I would say that I have written 90% at least of..

Interviewer – 236 papers, yes

Which is not a good thing actually

Interviewer – Why do you say that?

If I had my time again, I would spend more time pushing the graduate students to write the papers. That's another issue in a way because it is an essential part of a graduate students training. That's a different topic.

Interviewer – No, no that's part of what I want to talk about. When you began what was your introduction to publications? When did you actually start writing papers?

I wrote my first paper while as a graduate student in fact in [overseas university] and I wrote a couple of reviews simply because one of the [overseas university] staff had been asked to write these reviews

Interviewer – These are reviews of other papers, or of a book?

Chapters in a book, reviews of other people's work.

Interviewer – Sorry, just to double check are we talking peer review, or review of a book chapter that has been published?

A review of book topic, it was part of an encyclopedia of organic chemistry.

Interviewer – but were you offering peer review or had it been published already and you were doing a review for …

We were reviewing the published material.

Interviewer – it's confusing because it's the same word.

We were basically summarising a field, so if you wanted to know about sulphur hydroxy acids which is what it was about, Rod's Dictionary on organic compounds had chapters on all these sorts of things. We did hydroxy acids and keto acids and so it summarised all the known literature in a sensible and useful way, so it was a review of the Chemistry whether it was good bad or indifferent. It was there, so someone who wanted to know about that area could go to that volume. So what happens one of the editors of the whole thing was my supervisor, and the main job he had was to get people to do the writing. So he came down the corridor and said why don't you do this in your spare time which was good. They were my first two publications, I wrote a couple of review and the next were two papers I did as an academic.

Interviewer – and how did you at the time know where to send, which journals to send them to and what form they needed to be in, is that something you worked out for yourself?

Well you know, you read as a graduate student you read and figure out which journals have stuff you are interested in. My first publications of the work I did at [university] – my first appointment was at [university] between 1965-1982 and I came here in 1983 - these first publications were in the *Australian Journal of Chemistry* because I was trying to….

Interviewer – Even though you were in [overseas university]?

No, no I had come back. The ones I did in Cambridge went into special encyclopedia book volumes, but the first actual research publications came out of Monash. So I put them in the *Australian Journal of Chemistry*, being a good nationalist. I don't do that any more.

Interviewer – yes well you wrote 99 papers for them and then the last one was in 1996 and you seem to be sending a lot to Tetrahedron (9.12)

I gave up on the Australian *Journal [of Chemistry]* because in the early days the Australian *Journal [of Chemistry]* was sent to every academic library in the world, so everyone had it, then CSIRO said they couldn't send it out for free and they had to charge subscriptions, libraries started slashing subscriptions. So the problem was that not everyone took the *Australian Journal of Chemistry*, and if you are publishing something you want to put it somewhere where people will read it. The other thing was they stopped giving free reprints so you had to pay to get reprints. Well in a way this is not an issue any more because I don't think anyone writes for reprints but they still get them, I mean if you want to pay for it you get it off the internet. You don't need to write away asking for reprints. But that irritated me because a), it wasn't being widely read and b) they were charging money, whereas you will notice I have switched fairly heavily to Tetrahedron gives you 25 free reprints and everybody gets it, everybody reads it, it I a journal with a higher impact factors these days.

Interviewer – It's subscription though?

Yes its subscription. But it doesn't cost, unless you subscribe, I actually get a copy because … [shuffling around on desk] it's this thing, because I do a lot of refereeing for the, But it's

a thing that every person working in this area of organic synthetic chemistry would read that and so what you do is clearly visible.

Interviewer – one of the things, sorry, I will just. When did that happen with the Australian Journal of Chemistry, when they started charging, how long ago was that?

It would be in the 1990's, if you tell me I stopped publishing in 1996 it would have been about then.

Interviewer – which is interesting because it is about the time that things started going online. OK, have you heard of the expression open access publishing?

Yes

Interviewer – what is your understanding of that expression

Well, freely available and not having to pay to read something.

Interviewer – and are you aware of any journals that you have looked at that are open access?

I think the only open access at the university library has subscription. There is a lot of Open Access materials but not specifically journals I would say.

Interviewer – let's talk about your searching for material, in terms of your doing your research rather than your publishing. How do you peruse the literature, how do you find out what's going on.

This has changed enormously if you are interested in change because in the [university] days the science library was down the corridor so basically every Friday afternoon they would change the whatever came in that week would go up in a special area and the other stuff would go away so I would go down every Friday afternoon and just go through what came in and literally turn the pages and look at the pictures. With chemistry, this is an interesting situation for synthetic organic chemistry because this is the sort of stuff you get. So you can sit and flick through and look at pictures and you might see something that is interesting that you would never get from the title. It's like reading comics. You can do it at home in front of the television. You can certainly do it in front of the cricket because if

anything interesting happens in the cricket they replay it a million times. That browsing technique you cannot do anymore. What I do now, well I browse with that [indicating *Tetrahedron*] because I get it in the mail. I still get a few other things but not many. For years I subscribed to major journals, personally, about five of the major journals, so I would do it at home, browsing.

Interviewer - was that something you paid for? Who paid for it?

I did

Interviewer – out of your income, OK

That's tax deductible. Then in recent years I have gave up because I have spent lots of money. And in fact recently [identifying information] I have thrown away vast numbers of journals. No-one wants them anymore, you can't even give them away to Indonesia. So that has changed enormously. So what I do now is I try to keep up with a handful of the major journals but I do that very badly.

Interviewer – and how do you do that?

Its now on the web, you can get access. So you have to go to the journal through the web, scan the table of contents. I no longer go to the library and sit there and actually turn pages.

Interviewer – but you are doing the same thing though, you are just doing it online?

Well, scanning the titles and that is very different, so there are things that I miss. Because you can have, I mean I work on tetracyclic (?) compounds like tendol (?) so you go through and look for those words in the title. There might be a paper on steroids which I'm not involved in at all but if I'm turning pages I might find in a steroid paper that there is a fantastic reaction that occurs to me that I might use in my area that isn't completely different. And no-one is going to put that reaction in the title, so you would just never find these things anymore.

Interviewer – and so do you do searches rather than going to specific journals?

Yes. You can. I use SciFinder quite extensively. So if I am thinking of making compounds of this type, I draw the structure and see what's in SciFinder and that is not bad, its not..

Interviewer – so in SciFinder you can put in an image and it will search for that image?

You can draw a structure and it will give you every reference to anything that looks like that.

Interviewer – That's really interesting.

You can put in a specific structure and it will give you every reference that quotes that specific compound.

Interviewer – That must be a revolution.

It's brilliant. I mean it is absolutely brilliant. So if you want to know if something is known, you no longer go to Chemical Abstracts or barstein (?) which is what we used to do in the old days, although these things are still produced. All you do is go to SciFinder and you do it from your desk.

Interviewer – So you have lost in some ways you have lost the serendipity you had before of being able to flick through the journals but you have found a different one by being able to pick up even obscure.

But it's not as good

Interviewer – But you think you have lost something there?

Yes, definitely lost. This is not as good because you really get with SciFinder what you look for and my other worry about SciFinder is it's not as accurate as they like to pretend. Because there are things that I know about that I have looked for and SciFinder hasn't got. And that's a worry because if you are looking to find out if a compound has ever been made before, if it is not in SciFinder it doesn't exist.

Interviewer – With SciFinder, how broad is Sci Finder's coverage, is it missing journals?

It doesn't miss journals that are important, that's not the problem, it's the abstracting from the journals that…

Interviewer – It's the way they have classified things?

Yes, but it's, I'm perfectly happy with the coverage, the coverage is huge. If you publish in something that SciFinder doesn't read then you wouldn't expect anyone to…. It's just in the abstracting that they make mistakes.

Interviewer – And once you find something there, you say 'that's an interesting one I'd like to have a look at that', do you ever encounter problems in actually getting hold of papers?

Yes, you can get some of them in *Tetrahedron*, the Elsevier ones for instance, you can just click on the thing and actually get a pdf of the paper straight up.

Interviewer – Is that because the library subscribes?

Because the library has it. But also some the library has, *Synthesis* for example, you have to subscribe in some funny way and you can't actually get the real thing without going to great lengths. Patents are very difficult to get there is a technique where you are supposed to be able to go and get the patent and sometimes it works but most of the time it doesn't. But at least you get the reference and I can go and chase in the library.

Interviewer – What do you mean by go chase in the library.

Well the hard copy, I mean if it is a journal the library does have, say *Synthesis* that you can't immediately access without having a password and all that sort of stuff, at least you have the reference and a summary and provided you have a relatively decent library you can then go and find that.

Interviewer – And do you find that the material UNW subscribes to is sufficient for you? Or do hit barriers there?

It is shrinking they are reducing their range but it is still pretty good.

Interviewer – and what happens when you do want something that isn't available in the library?

They will get it on interlibrary loan from someone else. The way they cut is based on not everyone cutting the same thing so they do talk to each other around the country. We get a lot from the ANU because they still have, they have more money than everyone else. You don't believe that do you (laughs).

Interviewer – Just in terms of people requesting and you requesting of others for papers, does that still happen?

I get requests from people, rather than asking for reprints, if I publish something, they might email me and ask can you send me a copy and I just send them a pdf of the final manuscript.

Interviewer – does the frequency… because it used to be that people would send you a letter or a card and you would send out your reprint. (21.52]

I still have a little card. You get them from strange places. I used to get millions of these. [found a card on desk and showed me]

Interviewer – so this is what people refer to when they say get a postcard?

A reprint card, I would call that. It's amazing. I used to get hundreds, and I would send hundreds.

Interviewer – so this would be in the journal?

Yes this is a *Tetrahedron* one. What I will do with this guy, he's an Indian. The problem is he doesn't have an email address, so I will have to print something and send it

Interviewer – So he has this printed out, because this is his personal one

Yes, and then you tear that off and put it on the envelope

Interviewer – Oh right, thank you for showing me that, because I've never seen one.

I haven't actually got around to doing anything about it. Poor man. It looks as though he's retired and gone off email, I'm not quite sure, but you get requests where you can just send

a pdf or you get requests where sometimes from people who don't want a specific paper but who know I work in the field I am in and say can I send some relevant stuff, and this is usually from graduate students in places like India who are feeling unloved, 'please kind professor will you help me' that kind of thing. Still a lot of that happens. I would very rarely ask people for their paper. Because if I find out about them I can usually just get it from the web.

Interviewer – so have you noticed that there has been a drop in the requests

Oh yes, and even in countries, like, well India is a good example. They are better at all this fancy computer technology than most of us anyway so they can easily access the stuff.

Interviewer – just to jump to something we were talking about before and to finish off that section in my mind, we talked about your experiences when you were starting out in publishing. Now you are responsible for others, you have supervised a great number of PhDs and Masters students, what kind of training or handholding do you give your students in terms of explaining how the publishing system works and what they need to do? Is there anything formal?

No and this is probably where I should have done more. If you have a good student, a really good student, it's easy to say to them we want to write a paper on this and this is the content, go away and write a draft. And this is what you should do for every student. I have done it increasingly as time has gone on but I should have done more earlier on. Just to explain, the mode which my publishing has gone. The first publishing cases at Monash, I had written the papers before the people had finished their thesis. But that slowly changed to a situation where the paper is not quite ready because the person has to do a bit more work. And in the end you finish the thesis, which when you are writing the thesis you have to make sure you fill in all the gaps and so I have held off writing paper until after the thesis is written. But helped the students in terms of so many chapters and this chapter we will deal with this and then the next with that and so on, with an eye to taking each of those as a paper. So you have a mental picture of how the papers will develop. Then the papers would not actually be written until after thesis has come in. So what I would do is sit down with the thesis and take the section that's relevant and rehash that into a paper, It usually means shortening and making it more tight and concise.

Interviewer – So they write the thesis and you write the paper based on that.

That has been what's happened. In the second half of my career, probably …

Interviewer – so at what point would they take the responsibility of writing a paper themselves? So they would have 3-4 or however many publications from their thesis but at some point they would start talking responsibility for writing their own papers wouldn't they?

But if it has been work they have done with me, it would end up coming out through me. Which means they would write drafts and increasingly people write drafts, but they would only write a draft about something if we have agreed that's what it is going to be about then they have that guideline and they go away to write it. So if they are still around after the thesis is finished they will sometimes write the drafts. If they disappear and go to another job they amazingly find they have no time to do this because they are busy doing something different and they need to devote their whole time to that. So that's where I say most of the time I end up writing the paper after the thesis. But sometimes if the student is still available and accessible they will write drafts and we will knock that into shape.

Interviewer – so when does that transition occur when someone takes their won baby steps without having somebody holding their hand. There must be a point in your career as a chemist when you say I am going to write a paper, I am going to take responsibility for writing a paper. When does that occur?
28.31

Well it can occur at that stage.

Interviewer – at the post doc stage?

Well even at the post doc stage they are writing under supervision in a sense but increasingly, certainly a postdoc would write a draft and then the draft might be very good, it might be 99% perfect and need very little correction but it would still be a draft. If the post doc, for example, does some moonlighting and does some independent work that is not on the project that they are working for their supervisor, then there is no reason for them not to write their own paper and send it off and be quite independent about that. So that is the first point at which they become independent.

Interviewer – presumably that has occurred in the past with people you are involved with

Yes

Interviewer – so do they do that completely independently, or would they say I have done this work, where do you think I should send it? Is it that sort of advice?

They would ask about it and they would usually tell you I have this funny idea, and I would usually be happy to tell them that is fine you are quite welcome to do that and then they would talk to me about how should I do it and where should I publish it and so on and I would give them that sort of advice but I would count that as their work. That happens more, it doesn't happen very often these days at post doc level. It used to when we were much more relaxed about the sort of work that was being done, these days with the granting situation you can only do something if you have grant money and you then have to deliver what the grant is supposed to deliver. So you hire a post doc and you want him to do whatever it is that the grant is about the money is there for. So it is harder for someone to drift off and do their own thing.

Interviewer – So is terms of the situation like impact factors of journals and the journals that are going to be better for your career in the longer term and all those sorts of aspects is that something that just comes up in general conversation or is it something that people just glean? (31.10)

It does. And it's important, its more important, its increasingly important. My personal view is that it's a load of nonsense but if you don't play by this sort of game you will lose out. So if you are a chemist you must publish in journals with a high IF, well read whatever, but the irritating thing is it is the same paper whether you put it in a journal of low impact or high impact. And the impact factor is sort of a fashion thing. I mean the higher impact journals in Chemistry. One is a German one [indistinguishable] amazingly, they have been very clever, very good editorial policy, that has a very high impact factor. But most of them are American. The *Journal of the American Chemical Society*, the *Journal of Organic Chemistry* they have invented *Organic Letters* to take over *Tetrahedron Letters* which was a perfectly reasonable thing, but the Americans wanted to do it themselves because they make money out of it.

Interviewer – And where is Tetrahedron?

There is a *Tetrahedron Letters* which is similar to that [indicating journal] but it is the short version.

Interviewer – yes but where does it come out from?

It's British American, European, it's a commercial journal. Whereas the *Organic Letters* one is under the banner of the American Chemical Society. So the ACS makes money out of it. But also the fundamental thing is that Americans will only read American literature. So everyone crawls over broken glass to publish in American journals for the Americans will read it. Which is absurd, but if you take the logical view and say rats I'll put it in *Aust J Chem*, the Americans ought to go and read that but they won't. We have had stuff in the *Australian Journal of Chemistry* and was six years later republished by an American group, a very respectable group who didn't bother to read the literature. I sent the guy a reprint but nothing happened. The referee didn't notice, no-one else noticed.

Interviewer – Do you think that happens often?

It shouldn't happen but I'm sure it does happen quite often because you send the paper in and the referee doesn't know about it and the referees don't have time to site down and search the literature to check.

Interviewer – I suppose if you are an expert in the field you should know.

Yes but this was when I realised Americans don't read anyone else's literature. They are the most insular country. But they do fantastic chemistry so you have got to be involved with them, and if you want to impress and get on, you have to publish in something they do read.

Interviewer – Speaking of refereeing, obviously you referee for Tetrahedron, how much refereeing do you do, per annum, per month, per …

I do a deal, they made me one of their something or other referee for which I get a free subscription, and the deal there is I referee at least 10 papers a year from that journal. I probably do a dozen. About one a month. *Tetrahedron Letters* I independently probably get about 10 from them as well. They have different associate editors so you can submit a paper to any one of half a dozen people. So I get editors independently sending me stuff to referee, it doesn't go into a central office so they don't keep count. So the guy from new York wouldn't know I have got tone from Melbourne and he wouldn't know I have one from Japan and so on. So I get a bunch of those, it would certainly be half a dozen to 10.

Now you don't get them all in one clump. I get *Organic Letters,* this famous ACS thing, I get about 5-6 papers per year, Journal of *Organic Chemistry* – which is the other main American organic one, I get about 5 of those a year, and *Australian Journal of Chemistry* 5-6 per year, I'm always refereeing something.

Interviewer – it sounds like you would have about one a week.

Yes I have got one here today

Interviewer - So how much time do you think that takes you?

It depends, if it's a good paper by someone who is good and you know the stuff is good and you read it and it is terrific, and it is accepted, then it's easy. Where it takes time is if there is something not right with it and you have to look carefully at it and you have to look things up and you have got to then justify if you are asking them to rewrite something, then justify it some more if you are saying no, I am rejecting it. So they are the ones that take time. So with some of these journals there is the issue of whether something is urgent. It might be a perfectly good piece of work but you might not think it is urgent enough to disrupt the whole paper. *ARKIVOK* is another one, I do about 10 of those per year. I do a lot of refereeing.

Interviewer – And how do you feel about the time you spend

In a way I don't mind because it forces you to read things you might otherwise not see. I have never turned anyone down, even if I'm travelling which I do a lot of, I will usually say well I can't get a response back until whenever are you happy with this and they will say yes even if it is a bit slower than they initially asked, but I find I sit on aeroplanes reading these things.

Interviewer – And has there been a change in the turnover time, both from your perspective of someone who is publishing papers…

Publishing is quicker than it used to be, the turnover from getting the manuscript in to getting the paper out is much quicker than it used to be.

Interviewer – so what was it and what is it now?

It used to be 9 months, now its 3-6 months. That was because they did all the rewriting and printing and typesetting and all that sort of stuff. Now they do nothing. Well the residue of the nine months goes into getting the paper sent in. Now you not only have to do the work and write the paper, you have to format it according to some template each journal has. And this just drives you up the wall. It is partly why I now stick to *Tretrahedron* because I have finally figured out how to use their template. And I am reluctant to start to relearn how to use somebody else's who is different. It is just a pain in the neck, it really is.

Interviewer – do you find that, or do you think that the fact that you do a lot of, because the journals you have listed tend to be the journals you have published in, do you think that there is a correlation there that you are looked more favourably on?

Yes, if you publish in a journal then you are fair game will be asked to referee for it.

Interviewer – OK so the causal arrow goes that way but does it go the other way, that if you are refereeing for a journal you are more likely to be…

It doesn't ensure your publication. Absolutely not.

Interviewer – in terms of the, obviously you spend a fair amount of time doing this refereeing for a fair number of journals and tetrahedron sends you a subscription that would be worth how much, couple of hundred bucks?

Yes a couple of hundred

Interviewer – Are you given any other payment from anyone else?

No no that's it. It's a service to Chemistry, well it cuts both ways. If people don't referee, when you send a paper in, you are depending on someone to do the refereeing for you, you are asking them to do that. To my mind the least you can do is referee somebody else's. I'm basically a good citizen.

Interviewer – this is quite a broad question and you can answer it however you feel. Why do you publish?

Because of the taxpayer's money - it is fundamental. The taxpayer is paying my salary, my research grants, all of this sort of stuff. It is absolutely imperative that you publish to give them back what they pay, it is not good enough to do the chemistry unless you tell people about it. A lot of papers, people will say I don't want to publish this because it is not really important, I only want to publish my top stuff, and that is again wrong because in the synthetic organic chemistry business we are making new compounds. And there are some new compounds that don't fit, they sit out on a limb, and I certainly don't publish everything, you just can't do that but from time to time, there are some journals *ARKIVOK* for example which I hate but it's a fairly crummy journal but it takes publications of new compounds. People use it to deposit a whole number of new compounds in there. That's valuable because the work is done, it has got to be available to someone. I might think it's a crummy paper and the compounds are not terribly exciting but someone else might read that and say gee that's just the sort of compound I want for some strange biological thing or whatever. They might see something that I don't see. And so you must publish even what you think is mundane stuff in my view.

Interviewer – With open access, one of the, there is basically two ways of going about open access. One is to have a journal that is published without a subscription, so it is freely available to anyone

Actually ARKIVOK is one of those.

Interviewer – Oh is it? OK. And the other way is to, placing material into an institutional repository, PubMed is a good example in the medical field. One of the ways that journals that don't have subscriptions pay their way is to ask for, its an incorrect term because its called author pays, and usually the author doesn't pay, its part of a grant., so its really pay on submission, and there is a suggestion, certainly this is happening overseas, that the Australian Research Council has as part of the grant they give you, money for paying for publication in an open access journal. Whether or not they go ahead with this because they seem to be dithering around and now the head has gone off to the University of South Australia, so who knows what is going on. But if that were to occur, how would you feel about that, obviously money – they only have a certain amount of money in their pot, so some money would be taken away from research to pay for publication. Do you have an opinion on that?

Well either the author pays to put their stuff in or the publisher pays

Interviewer – the library pays

Am I correct in saying there are three options, the publisher could pay, to accept the material and make it freely available, or the reader, the other likely one is the reader reads something you would have to have a subscription.

Interviewer – yes which is what the library does, the library currently pays. There are three actually. The library pays, you have something like the Australian Medical Journal which is open access and that is funded by membership to the AMA, so you just submit and alternatively, author paying, now as the case with some journals, or there is some allocation in your grant for the publication point. There are some journals where it is not completely open access, you have the option of choosing to be open access in that journal, and in theory, they are supposed to reduce the subscription price by the number of open access journals. I don't know if that equation is occurring.

I would not hold my breath

Interviewer – but in terms of money being taken away from research effectively for publication do you have a..

I wouldn't want that to happen. I know this is a huge problem and in the end I think open access has to be there, but yes its difficult, who pays?[22]

Interviewer – yes that is one of the big problems being nutted out

Yes but with the web now we should be able to work out something that is relatively cheap

Interviewer – (laughs) that's why I'm writing a whole PhD thesis on it, its very complicated.

Yes it's a huge problem

[22] The long explanation I had to go into in this interview about different types of funding for OA journals made me decide that I would not ask the question about how people felt about pay on submission costs. It represents an 'attitude' question rather than a 'behaviour' or 'experience' question.

Interviewer – we will get there is the end. What is your understanding of the copyright status of your work?

Oh, it's copyrighted by the publisher to publisher.

Interviewer – and how do you feel about that?

I don't mind that. I don't have any problems signing off on copyright.

Interviewer – and you haven't encountered any problems where you have wanted to use your work and haven't been able to?

No, if I write a review or a book and I want to use something I write them a letter and ask them and they say yes its fine. I have never had any problems with that. I am happy for publisher to have copyright, they have to earn a living. I am happy for them to have the copyright. It also means it helps people not to publish twice. Some people publish the same things twice in different journals. If you have published in *Tetrahedron* and the form you have signed means the copyright belongs to them it might just stop you writing the same stuff and sending it somewhere else. If Tetrahedron found out about it they could sue or do something. You shouldn't publish something twice anyway but some people do.

Interviewer – so you are talking about an individual publishing the same material twice and that the journal would pick up on it, and yet your work was published in a different journal unwittingly by someone else repeating the work you had done.

If someone quoted without asking permission.

Interviewer – No I'm talking about the American group doing the same work that you had previously published because they were unaware of it, but it was you guys, not the journal, is that right that noticed that this had happened.

Yes, Oh I didn't write to the journal. And they did the same chemistry but they wrote different words. They wrote it in a different way. I'm not sure if the copyright is for the actually form of words. I think it would be the form of words. When I mentioned it would slow someone down from submitting something twice, it would not stop them because if you want to publish the same stuff twice you would write it in a different way. So it is not a direct copy.

Interviewer – Do you think it happens much?

I don't think direct copies get duplicated but a lot of chemistry gets recycled.

Interviewer – yes my dad's an engineer and he has talked about in engineering that sort of thing happening.

Yes, you write it in a different way, a different story especially if one of the journals is an obscure one.

Interviewer – [Identifying information] There are 38 universities in Australia and about half of them now have institutional repositories [identifying information]. It is like arXiv where people can put in pre or post prints of their work which is freely available. It may or may not be tied into the reporting requirements of the RQF, that's up to the administration to decide. Is that something you would be prepared to put material into?

Sure, I would be happy to put things in. This again is the taxpayer's money. You have got stuff that should be available. I am not at all inclined to protect [my work], a lot of people I know are paranoid, if we put this out there a lot of people are going to steal my ideas. Life's too short you have just got be prepared to lose. Occasionally you will get your fingers burnt. My [philosophy] is to trust people until proven otherwise and a couple of times I would have been done in the eye, but most of the time its not a problem.

Interviewer – One last area of questioning which is quite small, is talking about what is referred to as grey literature, supporting literature of work, so you would have your supplementary data and so on. What do you do with your supplementary data, the back-up material of your work.

Oh no I'm not talking about the same thing, lets say I publish something in say *Journal of Organic Chemistry* they have a standard format where you put a whole lot of stuff with them as supplementary data it doesn't appear in the actual journal and the experimental in journal is abbreviated. But the full experimental is given, it gets refereed and its available on the web. So if you read the journal, after you can go to the web and access it. That's real supplementary data, but I think what you are talking about is the hard lab notes and spectra. Can you see all those plastic boxes [in his office and a ladder on the floor!] Because I accumulated all of that when we moved because I had a much bigger

office and some of this in labs as well and we have a much smaller lab space. So the names on them indicate whose files of spectra they are. I've thrown away a lot of stuff published a long time ago. I think we are supposed to keep it for 5 years after we have published.

Interviewer – surely that's more than 5 years worth?

Oh a lot of it hasn't been published I've got a lot of stuff still to write. Some of it will probably not lead to vast numbers of publications. The other little cannon boxes are research samples.

Interviewer – if someone was wanting to repeat some experimental work that you have done, that you had published, would the supplementary data be sufficient, to repeat..

Yes, if someone writes to, lets say I publish in *Tetrahedron* and I haven't lodged the supplementary data for it, I've put full experimental goes in, they might say have you got the spectra. The *Journal of Organic Chemistry* will want us to lodge the actual spectra, most journals don't, they might want you to send some in, but they won't have it available, and people write and say they want a spectra so you can dig it out of a file.

Interviewer – so you decisions on what to throw out or not would partly be based on the lag

Its based on A is it published and is it some time since its been published. If it has just been published I try to keep it.

Interviewer – so if there is a repetition of your work and people are after more information, its usually fairly soon after publication is it?

Yes well if it is later then that's their bad luck. I mean I threw away a huge amount of stuff I had brought with me from [university]. 1970's and 80's, no-one had wanted to get the spectra, but I've tried to keep, mainly this is stuff I still need to writing stuff up, and things I've published reasonably recently.

Interviewer - So all the stuff you have ever done is either sitting in a journal with supplementary material attached to it electronically or not, or in those boxes.

Or is early publication.

Interviewer – I'm just thinking about long term sustainability.

Things like NMR Spectra here would be backed up so if someone wanted something I could probably find it even though I have thrown away the hard copy. That's six computers.

Interviewer – That's the other area, long term sustainability of electronic resources

Absolutely

Interviewer – OK, that's excellent, that is everything I wanted to talk about and it has been very useful. Now I am hoping to, I am basically interviewing chemists, sociologists and computer scientists at UNSW and ANU, and I may go to QUT, and doing some comparators to try and work out interesting things.

It sounds good.

Interviewer – so if I as an ex journalist, I tend to write, so I'm hoping to get some publications out without much delay, so would you be interested in me sending you or giving you an alert of things as they came out.

Yes I would. I have to say I found your questions excellent

Interviewer – Thank you.

I mean I have done a few of these sorts of things and most of the time you are scratching your head thinking what do you really mean and what is the issue but I think you have hit all the points very clearly

Interviewer – this is my second set of interviews so I did effectively have a practice run with a different group.

Yes to me it's been a very sensible logical approach, I can see what you are driving at and I think its important.

Interviewer – yes well I hope [end of tape]

Appendix 4b - Full transcript of interview: Sociology at university A

(25 October 2006)

Well this is an interesting project.

Interviewer – I hope so [laughs] I am trying to… there is a lot of talk about opening up access to scholarly literature around the world. And there is a lot of activity happening, elsewhere, not so much in Australia to that end, where governments and so on are putting mandates down and funding bodies are putting mandates down and saying scholarly publishing must be made available and there is all sorts of activity going on at a government level and often at a library level but there doesn't seem to be much discourse with the academic community. There is one quite substantial study that was done, a very good study that was done in America where she had the radical idea of actually talking to some academics and that is very unusual, and so I thought that is what I would do.

What do they mean by being made available? I mean it is available

Interviewer – Yes it is available if you are in a university where the library pays a subscription

Yes that's true

Interviewer – but if your library doesn't pay a subscription to a certain journal, it's not. So what they are talking about is different publishing methods that take the subscription aspect out of it, so once it has gone through the peer review process the material is freely available to anybody

Presumably it is on the internet

Interviewer – yes

And instead of having to subscribe on the internet, it would just be free to air as it were.

Interviewer – yes so if you were in Africa you could get it, or you yourself personally travelling somewhere you could go to an internet café somewhere and pull it down. That's

the utopia that is planned but it is a long way before that will happen but there is movement afoot.

Some stuff is available but some isn't, yes.

Interviewer – well why don't we start with that. Have you ever encountered any problems when you are looking for material?

Well not when I am actually writing a project because most of the things that I've done have depended on what is in our library or at [another library], and a lot of the time I have worked with monstrous(?) ideas and quite often I have just used whatever references are available that were relevant and not bothering about kind of covering the field, because my idea of being interdisciplinary, the field is either so broad you don't worry about trying to cover it. Or the idea is not so well defined it's immediately obvious what is necessary for me to know in order to write this particular piece.

Interviewer – So you are in the position where if there is two papers which are sort of along similar lines

And one is available and the other isn't I would use the one that is it doesn't matter.

Interviewer – So have you ever found something 'oh I really do need this, can't get it,' have you ever requested it from author, something like that?

I vaguely remember doing something absolutely years ago. Not from an author, it was an interlibrary loan and the other library had photocopied it for me and then they sent it up. But that was before the internet anyway so I don't know if that's relevant in consideration to your project in any case.

Interviewer – Oh you can still get interlibrary loans, they just send it electronically.

Yes I know, so I would say on the whole for my what you call professional work I would have not encountered any problems because of the way in which I work. In any case I think that maybe for many of the people working in the humanities. It would be different for people working in the sciences because you always have to cover your tracks in the sciences. You always have to work on a new project in terms of what has already been

done and you have got to know what has already been done in that specific area. We're actually not always in that position you know.

However I have encountered problems on the internet if I have just been following something up as a matter of curiosity. Or thinking about something I might do further down the track and doing a bit of search and I will come across something where I could access either the whole article or the abstract but in other cases you would have to subscribe personally.

This has also happened to me particularly in the health field. Of course I don't always trust doctors and now I am of a certain age you know health problems and I like to research them on the internet myself. And in that area at least 50% of the time I was not able because I am not prepared to subscribe everything and for some of the medical journals have to put down the qualifications anyway, so I haven't done it.

Interviewer – Oh that's interesting, so with some medical journals they won't allow you to subscribe if you are not…

Well I don't know if they will allow you, but you have to put down who you are and what your qualifications are and I am just assuming that if I wasn't a medical person I would not get a subscription, I'm not sure.

Interviewer – You would think they would just take your money and run

That could be true I have never tried really.

Interviewer – And so these are journals this university doesn't subscribe to and so.

They probably do but I couldn't be bothered going to the library and looking them up. I do that at home at my desk, but you know there are so many journals about now it is quite possible that the library doesn't subscribe to them all. But I have always been able to find an alternative source of information that was on the web that gave me more or less the same thing. I mean if you are looking at cardio-vascular problems well there is absolutely billions of references on the web. So you are not stuck with just needing the one.

Interviewer – would you say that is the case with both your work and your professional life?

Yes, yes

Interviewer – Well that's good. So the research that you undertake here in your professional world, what form does that take, is it interviews, is it paper, or journal based?

I've done stuff based on interviews, I've done conceptual articles and the conceptual stuff I rather do because it tends to be more interesting and more challenging but I have done things that depend on interviews as well. Mostly interviews, I haven't done pure quantitative research surveys and stuff like that. I've done a couple of things like that for internal reports and the student body. But I wouldn't call that research because it was written up without any other references and so on. (8.40)

Interviewer – OK, so when you are working and you are finding articles that you need to work with and so on. What do you do, do you go to the library and look up from your desktop and you print them out or do you leave them in electronic form?

A combination of things really. I like to read from paper. If I find something on internet which may be of interest, I tend to print it out usually. I more often than not go to the library and work from journal materials there or borrow a book or two because that is my preferred mode of working and something kind of congenial about having that stuff lying around. For me anyway, if I'm working on something.

Interviewer – I know that some libraries and I can't speak for [institution] but certainly [institution] will have a print version of each journals bound up to 1996 or something and then there is the electronic versions. Are you finding that the material is still there in paper form?

Well by and large for the stuff I have done it has been. But I'm not particularly prolific and so other people might find it different.

Interviewer – So when you do go to the library and you find the journal article you want in the bound form, do you read it there and then or do you photocopy it?

Then and there. If it is very important and I feel I need to read it again and think about it at home I will photocopy it. But generally on skimming I decide. That I probably need only a para or 2 to think about later on I might just make a note. If it is a couple of paragraphs I might just photocopy one page. It depends.

Interviewer – and presumably you have some sort of filing system for these.

Yes backs of envelopes, bits of toilet paper and so on in a file usually [laughs]

Interviewer – So what you do is whenever you get an idea you just write it down. And keep them together.

Yes that's right.

Interviewer – and so are you somebody who has the first paper that you ever thought interesting or do you purge material. Do you have an ever-expanding amount of research material.

Oh it's all over the place. It is ever expanding and even at my age there is still folders of stuff about interesting bits of ideas that I might follow up that I might have to live to 250 for all of that to some good one day. Because I am a bit of a generalist in my approach and I have got a number of interests and something that gets published or done in toto is often largely a matter of accident. I have published things with colleagues and I prefer to do this because they keep me going and they keep me focused and so every now and then I will be talking to someone and they say 'that's interesting' and 'why don't we do something about this' and that happens. And the other things that I do find interesting never happen because I don't get focused enough to get them done. But in some respects I don't mind because unlike an awful lot of people I still do a fair bit of browsing and read up on stuff that looks interesting.

Interviewer – and when you say browsing, could you describe exactly what you do when you are browsing?

I might go to the library to look for a book on something that I actually need and then I am at the shelf there and I might see something interesting and so I will take them off the shelf and sit down in the cartel and have a little read and so on. And I do browse on the internet as well for things I'm not necessarily going to do. But for example one of my postgraduate students maybe doing and even if I don't need to read it in order to help them I think this is a bit of a puzzle I might look that up. That sort of thing. I waste an awful lot of time, in certain points of view.

Interviewer – you never know where an idea is going to come from do you?

Well that's right (13.55)

Interviewer – so you mentioned that you like to publish with people because that makes it all happen, So what would you say is your incentive for publishing. Why do you publish?

Good questions, it certainly isn't career any longer anyway. I have got a couple of things coming out. It is probably in the first place the challenge of getting something written. And getting the feeling that I have rounded this up as well as I can and I 'quite like this'. The other thing is if I am trying to figure something out which I am often driven to do, I can't fully figure it out unless I actually write an article because I never know quite what I'm going to write until it comes out. But then the publication stuff comes afterwards. Because as you know it's a difficult process these days the acceptance (sic) rate on the average is something like 80-90% in all the humanities and social science journals for you have to try very hard to get stuff published and I haven't always been successful but one has several goes. And sometimes the thing comes back and you know the editors are gutless these days and if you have three reports and two are good ones and one is the bad one, they will sat you have to meet the requirements of the bad one in order for them to actually publish the bloody thing so. You know editors are actually clerks now, not editors. They won't say we actually like this and two people say its OK and just because the third one doesn't we still think it should go through. No-one has the courage or inclination to do something like this any longer So you know to get something published is sort of the second step.

Interviewer – Ok so for you the primary step is writing the article?

Yes I am always thinking "I think this is a good idea, if it comes out looking alright, with any luck it will be published somewhere"

Interviewer – so when you are writing it you are not thinking 'I might write this for X journal'

No no

Interviewer – so that's not a consideration?

No. no

Interviewer – So once you have written it is that when you make the decision about which journal might be appropriate for it.

Yes by and large. I'm not a networking person and I haven't, other than the colleagues in my school and in the faculty I actually don't have other connections. Colleagues who are in a particular network and who are more specialised than I am quite often get asked to do particular things, chapters in books or even particular journals. But I operate as a loner. I write something and then I crash around for a publisher. And that's doing the hard yards [laughs] you haven't got anything paving your way. (17.35)

Interviewer – So what are the decisions you make. Once you have written your paper, what are the things that influence your decision to which journal you will send it to?

Often the references used for the paper because that's sort of the field. There are just so many journals around these days. You probably know that. But I have usually narrowed it down to something else I have read for a particular paper.

Interviewer – and what is the longest period you have had between having rejections

Oh years. There is something coming out that I have written with Heather McKenzie from Sydney University who used to be a postgrad and I think it was a conference paper in Melbourne, possibly 2000-2001. And it was another paper for an in school seminar sometime before that. We fiddled around with it after the conference and submitted it to one journal and it came back, they knocked it back and then I fiddled around with it some more. After about a year I was thinking I can't be bothered with this any longer, and by that time I had retired and lost a bit of my motivation to do this kind of thing anyway but Heather is teaching and it would be good for her to have the thing published and I thought it was a really good idea I was quite proud of paper and hugely pissed off the journal didn't publish it so I had another go at it and sent it to another journal so it is coming out in December.

Interviewer – Is that typical of the time lag or is that a particularly long one?

Well that is a particularly long one. I've been a bit more successful with some other things. Two things I have had published in *Human Nature* on post natal depression in relation to evolution and on bonding those two accepted straight out. Oh no, sorry, the first one, the PND paper, one reviewer thought it was marvellous and the other reviewer was oh that

was funny actually, I have got to tell you about this. This person made a no of objections which were plainly silly actually they were inappropriate but the main point was I hadn't mentioned one particular person and the reviewer said it was totally necessary that I should follow up this person's work and even sent in a couple of references that were actually quite obscure. So at that point this person wasn't terribly well known in the field. I managed to find one of those obscure references and I decided that the person who reviewed my paper was actually himself. Because the writing style was so similar. I mean most people must think we are so stupid, you know [laughs]. So I mentioned it in footnote and I wrote to the editor and explained my reasons for doing so. And the editor is obviously and intelligent woman with a sense of humour so she published my paper. [laughs]

And then the second paper was published straight out. And of course I have a few, three or four, maybe five, conference papers that are published in the proceedings. I mean they were peer reviewed, you know that's kind of a requirement for publications of that sort and I now that some people have stuff sent back to them for editorial changes or so on. I have never had that happen to me, all my conference papers have gone straight through. Its just peer reviewed journals where there is this difficulty because there is this whole politics of journal publishing. And it is sometimes a question of pot luck as to who from your peer group is going to review a paper and how sensitive they are about their own position in the academic world.

The paper I wrote with [name] after my book that came out in 1993, was sent to an Australian journal and the same story, one reviewer though it was great and the other reviewer was really objectionable and said some very important considerations and literature were left out and gave us a few names we had forgotten to include and again it was the same story. I mean somebody was terribly annoyed because we didn't mention them.

Interviewer – So again you suspect that one of those names was the reviewer.

Yes, I mean [name] unlike myself is very well connected and she knows practically everyone and she knew straight away who it was and worked that one out. Of course they couched it in terms like we didn't cover the field sufficiently there were x number of names that we should have included among which arguable one of the important ones was so and so. So again we put so and so (it was a she this time) in a footnote. And I wrote to the editor and I said look these days getting together another 50 references is really cheap

and easy – by that time the internet was on – and you can go on forever, because in ever field you care to mention, the number of publications is absolutely enormous. We think we presented a good argument, we don't think we need to do an international world wide survey of everybody else who has dome anything remotely relevant to what we have written. So that was published too. But it's very very political. In many journals there are gatekeepers who will either protect their own interests or we have had this happen in another instance or who will guard their own political positions by making sure that stuff that counters their point of view doesn't get published. It isn't just unfortunately the case of people judging a paper for its merit or the quality of the writing, there's a lot more that goes into that.

Interviewer – and have you yourself done some reviewing?

Yes I have, not an awful lot, because as I said I'm not a well connected person. But I have always tried to be fair and I have once or twice sent something back to a journal which also included a postgrad thesis and I said look this is really very much not the sort of thing I will do myself. Because you know how it is now, there is postmodernism and there are people who are not that way inclined and for various other reasons and this particular one was so postmodern that I would have been inclined to say a knee jerk reaction this is really crap but on the other hand that might have been unfair. So I sent it back and said it's not my cup of tea, I don't work like that and I don't think like this. And I don't know the literature so I don't think I am a good person to assess this. I think that's a fair thing to do.

Interviewer – so you didn't review it.

That's right, I said I'm not the right person to review this.

Interviewer – and in your experience with papers that you have reviewed have your suggestions been taken up?

I think so, yes.

Interviewer – and you have ever done any editing type of stuff, been in the position of being an editor?

Well informally for all my postgrad dissertation. But no, I have not ever been asked to do anything like that.

Interviewer – and how do you feel about the time you have spent doing peer review, is that something…

I think it is very worthwhile. I think it is a necessary function. And I think, that if it were done properly it is a valuable educational function. Because you do help writers make the very best of their material and quite often with young academics particularly you mentor them towards better work. I will tell you about my good experience which was my first publication in 1979 in what was then called the *Journal of Community Health*. I had written a paper about breast cancer and evolution from the social perspective. So for that in the first part I had to have some hard information about the statistics on breast cancer and some of the biology as it was known then of the disease. So I did the best I could with that information and then I went on with my thesis which was more of a sociological biological take on the first part of the paper. And I sent it in to the journal and one of the reviewers said that he liked the idea of the paper very much and the second part of the paper was very logical and quite well written and all of that but there was a problem with the first part because I didn't have my finger on the pulse of that literature. And there were two pages of not just suggestions where I should be looking for material but actually telling me what I should be saying in order to strengthen my paper. And I thought that was so good that I wrote back to him and I said I really would like to have you as a co-author because I don't think that I should use all of this material that you have sent me gratis as it were. So he wrote back and said that this was terrific, so I incorporated all of his stuff in the first part of the paper and he didn't touch the second part so I was still the senior author, the main argument was still mine, and it came out under our joint names in the journal. And I felt it was such a good experience he was a very generous man he never really suggested we co-author the paper. He must have spent quite some time writing that letter to me about what else I should put into the paper. And this sort of stuff it doesn't happen any longer as you probably know people don't have the time to be generous. It's not how people should operate but in fact it is how they should operate for the best possible results all around. (31.36)
[question and answer with identifying information]

Interviewer – You are a free agent now aren't you?

Yes

Interviewer – When you weren't, when you were trapped within the system, did you have an understanding of the relationship between your publication output and your position at the university?

Yes of course. I applied for AsPro-ship twice and I was twice rejected and probably because the file of my publications was not thick enough. They don't read the stuff, they just weigh it. And the other reason was of course I would have to do heaps better than most over people because [identifying information]. And most people just look at this and say oh God, how did [she or he] ever last in this place 25 years or whatever it was you know. (33.00)

Interviewer – Now what is your understanding of the copyright status of your academic work?

Oh, pretty vague actually. I sort of know the system protects me from people exploiting whatever it is I have published without acknowledgement and photocopying excessive amounts of my work for unlawful non-educational uses. But I don't understand the nitty gritty. And frankly I don't actually care.

Interviewer – so you have never encountered any problems in terms of using your own work?

No but I haven't looked for them either.

Interviewer – are you familiar with the expression Open Access? Other than me talking to you about it?

Well before you talked to me about it I had sort of heard about it. But I haven't paid much attention.

Interviewer – so I will give you a basic description. Open access is the publications of papers on the internet immediately after peer review, either through and open access journal so that's a journal that doesn't charge subscription fees or by the author depositing a paper into what is called an institutional repository, a sort of digital library to ensure that people can access it there and then. So in principle is that something you would find appealing or not,

I think it's a good idea in principle. But, ah, yes I think it's a good idea because I don't think knowledge should be owned. I really don't. Once you put something together and you

publish it, its out there it has life of its own. And if it is to do any good at all you shouldn't have strings attached. I really don't think that's the case.

The downside of this and it depends very much on how people use the facility is that altogether too much is published in every field. We are absolutely swamped by stuff and an awful lot of it is useless for any other purpose other than the career of the person who produced it.

Interviewer – and do you have a solution for that?

No, I think it is going to get whole lot worse before the system collapses because it will because it is not sustainable even now.

Interviewer – and how do you envision that collapse?

I don't know. It will be after my time so I'm not worrying about it too much. But it will probably be not too much of a problem for hard sciences because it will be easier for them to rationalise their activities. I think people will eventually come to some sort of agreement that the overproduction of multiple authored papers from research teams in different journals with the names of the authors configured differently and the content of the article very slightly changed for the purpose of it being published in another journal.

I think the scientific community will come to some sort of agreement, that this is not on that there is not point in that sort of pernicious application of research results and I think it is possible that promotions committees at various universities will finally agree to the fact that they shouldn't just weigh the list of publications, that they should look for articles which are genuinely new and once that starts to happen then people will not be driven to over-publish as they feel driven now to do it. I mean you do know that happens. Especially large research teams in the sciences, they churn out stuff like bakers do muffins or whatever. They have this cookie cutter which they apply to their research all the time. And its not rubbish but it is pretty well the same thing all the time.

To me that is almost obscene. But it is different in humanities and social sciences because everyone wants to say something original. Well there is only about half a dozen original ideas around in every hundred years and they get elaborated again I mean my background is in psychology. I got a first class honours degree from [university] way back in the 1950's and that that time, I mean even now, we were actually sitting and discussing about what is

or might be the case like what actually happens. And every now and then you would say so and so theory is this and so and so's theory is that. But the theory was always about something. A question about what goes on.

Then by some sort of accident, a long road of accidents I ended up here in Sociology as a tutor to begin with. It was so strange. I was thinking how do I get used to this? Where I come from we sort of talk about states of affairs or possible hypothetical states of affairs. But in this place people constantly talk about who said what to whom about whom in which particular publication and what am I going to think about this, so everything is not even second hand but third hand. It's always about books, about books, about books. And they call that analysis you know. I mean it's useful in some respects and it can be very interesting and challenging but it is getting totally out of hand.

Interviewer – and that's then producing more papers

Yes, producing papers and more books, which as I said before nobody reads. Do you know people don't read anymore, they haven't got the time because they have to put in research grants to get yet another totally useless publication out. So their career can get ahead. And I haven't done anything much since I retired very largely because despite the publication that is coming out in December, I have lost the desire to be associated with that sort of process. And also because that sort of process is one symptom of a disease that pervades our whole enterprise which seems to have lost it bearing. It's doing so much and yet its going nowhere. And I just don't care any longer I would just as soon cook and talk to my cat and work in the garden. It seems more productive quite honestly. I'm sorry to be depressing you.

Interviewer – no no, it's good, its what you feel. I think pretty much the last thing I want to talk to you about it something you may or may not be aware of which is [identifying information] an institutional repository. It is basically, I don't know if you have heard of Pub Med

Yes of course.

Interviewer – well its like PubMed, but instead of being subject based, here it is institutionally based so most of the universities around the country are building one of these and it ideally somewhere where people could deposit past and current papers where they are kept and they are updated so if it is in an old format it is updated, so it is in there for perpetuity. Is that

something that you would find of use in anyway that you can think of? Would you be prepared to put your stuff into it retrospectively do you think.

Oh I probably would, partly out of obligation and a sense of possibly some misplaced vanity, I don't want to be left out if everyone else is doing it. But I can't see myself actually using it.

Interviewer- they have a very vague plan about letting people in the community knowing about it, so I don't know if you are ever going to hear about it. I went to speak to them at the library and they are just focused on getting it working and the next step is of course letting the community know about it, and there doesn't seem to be any great solid plans as things stand about that yet.

It is probably better not to let the community know about it because they might be sorely disappointed about the community's response to it. Like they will probably get one enquiry a year, something like that.

Interviewer – well that pretty much covers everything I wanted to talk to you about.

Good oh.

Interviewer – Now what am I doing, to give you the bigger picture, I am interviewing five people here in this department and I'm hoping to get a similar number in Chemistry and Computer Science departments and going to mirror that at the [other university] and hopefully get a few insights that show me differences between the disciplines and between the institutions. I will see how that goes I may have to pull in a third institutions I will see how it goes. So that is the general structure of what I am trying to do.

It is interesting.

Interviewer – But I am happy to send you any papers or findings that I have.

Yes please do, I would be interested. Well good luck, I think it is a worthwhile thing [tape ends]

Appendix 4c - Full transcript of interview: Computer Science at university A

(12 February 2007)

Interviewer –…. I think if you want to make changes to the way people work you need to have an understanding of their current work practices. So that is sort of what I am doing and I'm trying to get a baseline in the interviews I am doing. So the structure of the research is I am interviewing Computer Scientists, Chemists and Sociologists who each have different ways of publishing their work and I am comparing here to the ANU to see if there is an institutional difference. I suspect that there won't be, I suspect that the differences will be across groups rather than between campuses. So that is the way it is all flowing.

So pretty much what I will be asking about is your interaction with the literature both as a reader and as an author. And I am asking most people to start, just to give me some idea about how you are working at the moment. I know it is different between holiday time and term time, but about how much of your time is spent in teaching and admin and research?

Because I am a PostDoctoral fellow most of my time is being spent on research. I work for the ARC Centre for Excellence which you probably know about already in robotics. That means that there is significant practical component as well as the research component. Things like competitions and so on, which aren't research as such but kind of provide the motivation for research. So in terms of, I would say 80% of time is basically spent on research and I would acknowledge that is a privileged position that will probably end soon but I want to take advantage as much as I can.

Interviewer – And how long have you been in that position?

I have been here for about two years. Before that I was working for a cooperative research centre, which was half research and half development.

Interviewer – and prior to that was your PhD?

That's right

Interviewer – If we start thinking about you as a reader of research, how do you keep up with what is going on in your discipline?

Mostly it is conferences when I can get to them. But to be honest I haven't been to a library in two years. Because it is computer science most of the computer science researchers out there put their papers up on the web. And now there are services like CiteSeer and Google Scholar that just make it really easy to pick up papers. Other than that what I do is go through the conference proceedings of some of the conferences that I really like and pick out some interesting threads. Usually you would check out journal articles after that, once you have kind of found an interesting thread. And of course going to conferences myself.

Interviewer – and how many would you go to?

Probably two or three per year. And in Computer Science it is kind of known that the conferences are more important than in other fields like Chemistry. So to give you one example I have just submitted a paper to one conference ICML (International Conference on Machine Learning), and the publication there is regarded equivalent to the tier 1 or tier 2 journal. And acceptance rates are like 20% so it is a really big deal to get into that.

Interviewer – and you don't know yet? You are still waiting?

Yes still waiting. I got one back in 2001 and got into ICML in 2003 I think.

Interviewer – So when you are saying the conference proceedings you just go to the conference website?

Well usually someone in the department will have gone. So sometimes its more fun just to flick through the proceedings.

Interviewer – so they will bring back a book?

Yes and, but half the time the conferences you go to these days give you CD ROMs anyway, so. There is a certain pleasure in flicking through a book and saying 'oh that catches my eye', 'that doesn't catch my eye'. But the other option is going to the conferences itself (sic).

Interviewer – so if your colleagues haven't gone, you know that blahdy blah conference has just been on, so you just jump onto their website do you?

Yes, yep

Interviewer – and do you, and the proceedings are just up there?

Sometimes the proceedings are online, if not I will go through the library which will have access to the proceedings. So I usually will try the net first and if I don't then I go through the net and the net will have like with ACM [Association of Computing Machinery] or IEEE [Institution of Electronic and Electric Engineers] which are the two big...Both will have really huge databases and any kind of mainstream conference will be in one way or another be accessible through their website which I get access to through the library. But like I said, I haven't physically been to the library in an amazing amount of time.

Interviewer – but when you say you first go to the web, are you able to get onto it because you are coming from a UNSW domain?

That is what I said, I am first trying to get to the website just as an individual, if that fails then I go to the library and that usually gets me additional access. Just so I can work from home and stuff without having to mess around with logging in and all that kind of stuff.

Interviewer – so you are at home and rather than log in at the library, you probably have it bookmarked I guess and you have a look at it and if you can't go to it from there..

And within my own field there has been a tendency towards open publication. So two of the major, or three or four of the major journals ain my space and conferences in my space have gone to a policy where they make the papers online anyway. So things like the Journal of Machine Learning Research basically publishes all of the papers online. So if you want to you can subscribe to the physical journal but hardly anyone does because the papers are online.

Interviewer – How do they finance themselves do you know?

One of the, I mean, what do you need? OK, the attitude among some people within the research community is 'what do we get out of publishers?' Right? All that they really do is organise for people from within the community to review work from other people within the community, and then to publish a physical copy. And they seem to charge through the nose for that privilege. If members of that community are kind of coordinated then there is not much resources needed. You will need an editor to manage it. You need people within the field to review it and you just need someone to donate some webspace, which is not

really much of a cost for a university and the places hosting it get a certain amount of reputation as a strong place. So it doesn't really need that much I don't think.

Interviewer – OK that's a thread I do want to follow but before we get completely off what we were talking about before, you were saying that you are using CiteSeer and Google Scholar. If you want to look at a particular journal. No actually I won't put words in your mouth. Apart from looking at conferences or conference proceedings, you were saying sometimes you follow things up in journals. What are you looking for there? Are you wondering is so and so published this or 'I've heard' or I had better go and look at that journal. What is your motivation?

There is a couple of possibilities. Number one I am on some mailing lists and mailing lists are increasingly important, so they give me pointers to what's been published.

Interviewer – and they would be what, tables of contents from the publishers?

No, they are just who is doing what. And you know of get vibes 'Oh this piece of software is available' or 'this person is advertising for this job as a PhD student'

Interviewer – Oh I see yes, sorry.

So it is another source of information in addition to those. When you are saying what I look for in journals. It's almost like there is two ways I check journals. One is when I have a preconceived…I am doing some research and for the background I need this kind of information. So I will do a specific search for that. So that is one type of using journals and the like and conferences. So it is when you have a specific question that you need to solve as part of other question. Or you are looking at the background of an area to understand what other people have done.

The other way you use journals is kind of as a source of inspiration. So you kind of see where are things going, what ideas catch my mind, where can I get some novel ideas that will perhaps develop into new research streams. So I should have made it clearer earlier but really there is those tow kinds of ways of using journals. And when I was talking about flicking through proceedings it was more for the inspiration question not the directed research 'what have people done in this space', 'how can I approach it' type questions.

Interviewer – so when you are doing that, when you are doing your specific research, I'm writing a paper on blahdy blah, so do you then go to the journal and do a search, are you doing a subject search?

Typically what I will do is I will actually hit web first and in computer science these days the web pages of most academics have pretty near to complete publication record. So I have personally found it is much better to track people than to track subjects. So you go 'what is X X doing in this area, I know he is working on for example in my case cognitive architectures. I'll just see his website and see what he is up to and see what his PhD students are doing. I have found that looking at it from a people's point of view is much more productive than looking at isolated papers. Because in some ways papers are an odd artefact of the research that has been going on and basically for historical reasons there are limits on page numbers and so on. So you find that stuff gets compressed, stuff doesn't get completely voiced and really you don't get to see the big picture that you get from visiting a person's site. You see more of the research program and research agenda and how lots of these ideas fit together.

Interviewer – so you are not really looking…are you looking at journal sites at all?

Like I said typically not. But that might be specific to the computer science field that things move so fast. Journals become kind of the repository of established knowledge rather than the cutting edge. So conferences are far more important in computer science because that is where the cutting edge is. Basically because journals take so long, the turnaround on a journal is anywhere from 3 months to 12 months and by then the field has moved on and there has been 4 conferences and the conference schedule is much tighter than that.

Interviewer – so when you mentioned CiteSeer and Google Scholar, what would that be for?

That would be more for the background checking, the directed research type stuff/

Interviewer – so that's not looking up X X, that's looking up…

Yes, if I want to understand a subject and what has been done on it, what I will

Interviewer – when you want the big picture

Yes the big picture, I will hit Google, Google to find the people who are involved. Google Scholar to find relevant people or again just to get the feel and CiteSeer because it has access to different resources to Google Scholar but it is pretty much the same.

Interviewer- sorry to be so pernicky but it's what I am interested in

That's OK

Interviewer – Have you ever hit any barriers when you can't get what you are looking for?

Yes

Interviewer – and what sort of circumstances are they?

It tends to be the older material actually, so pre 1994 – 1995

Interviewer – would you have much use for that kind of stuff?

Yes it comes up occasionally, and sometimes when you are looking for the classic papers in the field, so some of the early papers in machine learning, but just to understand where the were at the time. That's when you tend to hit barriers and it is basically when you either go to the library or ask colleagues if they have a copy. (13.04)

Interviewer – and when you say go to the library is that because there is a hard copy there?

Yes and you just photocopy it out of a journal or a book or whatever.

Interviewer – how often would that happen?

Maybe once or twice a year.

Interviewer – so it is a technology issue rather than an access issue in some ways, it is simply because it was pre-web when it was written?

Yes

Interviewer – so in terms of modern material that you need to get hold of, do you ever hit a point because the library doesn't subscribe or anything like that when you think "I will have to work out some other way of getting this paper?"

It does happen occasionally but usually you will find that if you can't get hold of one publication, the author will have related papers that you can find. So it tends to be that particular paper than I don't look at but I find a related paper that is available easily or that is at a major conference but not a minor conference that the library might not subscribe to. But like I said my feeling is that especially over the last few years that getting access to this information like the ACM website or the IEEE website for those for rare exotic hard to get things is actually pretty good. Because those two groups or societies are so dominant, almost every major conference is linked with one or the other. Possibly a third in my area which is AAAI. But it is usually not that hard to get access to those major conferences.

The other things I am saying is that colleagues are pretty important in keeping up with what is going on.

Interviewer – in what way?

Oh I came across this really interesting paper by whoever, and then you will go "OK I will have a look at that and you chase it down. And they send you a link or they give you enough details that you can do a search to track the paper down that they are talking about.

From my perspective I certainly make sure all of my papers are accessible online from my website. That is usually with permission of the publishers that they say you are allowed to store a personal copy on your website as well as us publishing the physical version.

Interviewer – now when you say that, 'with permission' how do you know you have permission.

When we sign the copyright form, so usually with Springer or Kluwer or whoever is doing it. Or IEEE, whoever is publishing the proceedings, when you sign the copyright forms it specifically says you are allowed to publish a copy of this on a single website which is fine and the..

Interviewer – and which version would you put up?

It depends on the rules but typically I would put very close to the final version if not the final version.

Interviewer – But that's your version not their pdf?

That's my version yes. I mean for most conferences … that's the other thing, almost all the conferences I go to have switched to pdf as the main submission medium and its online submission so what I generate is what they use typically. I mean they might stick some extra stuff at the top. Which is different, it used to be that you submitted the raw files the document or in computer science we use a tool called LateX and they would modify and change them. But these days you say here is the pdf and pretty much what you see in print is what you gave them.

Interviewer – have you heard of, just on the whole idea of this copyright issue, of Sherpa/Romeo? It is a site… I have got a sheet that has information on it that I will give you at the end. It is a site that lists all of the publishers policies on putting up pre or post prints.

Yes

Interviewer – So you just type in the name of the journal and it comes up with what they call green, dark green depending on how open they are and how much they allow to be put up. Yes, that's another way of checking if you wanted to have a look.

Yes I didn't know about it but in most cases you have to sign a copyright form anyway so. And I do pay attention to those.

Interviewer – well lets just quickly talk about copyright, what is your, in your words what is your understanding of the copyright status of the work you have published? (17.56)

It really depends, there is not one standard, it depends on conferences. But most of them would be pretty open, most of them would be that you could put a copy on their website. After of course they have published it. So I won't publish a paper before I go to the conference to present its findings, or I won't publish a journal article until the journal puts it out but after that from all the copyright forms I think I have signed I have checked that and it is fine for me to put it up on my website. And if it didn't I would have serious

misgivings I would say, I would probably pursue it with them. Given that I wrote the work in the first place and I didn't get any income from them and the most you would usually get is a pile of preprints. But like I said the most important journals and conferences in my field are managed pretty much by the community itself, so then there is no problem, its just the case that…. Everyone else in the field pretty much feels the same way I do. So we make sure we have pretty open research.

Interviewer – so you're publishing in what are effectively open access means, but are you also putting a copy up on your website?

Yes, there is one case where I haven't put a copy up on my website because I just linked straight to theirs. But usually I put a copy up on my website because the publishers usually change where things are linked to and unless I know that the other people who are putting it up on the website are not password protecting it or putting it behind some stupid interface that stops people being able to instantly click and get the file, then I would put a copy up on my website.

Interviewer – so I would be able to find you either by looking up you and grabbing things off your website or by going to somewhere where you have published and it will be openly accessible

Yes and because you know, I mean its good to have some redundancy anyway so if there are two copies on the web and their website it down or my website is down then you can find it from somewhere else. So redundancy is a good thing.

Interviewer – OK this is a bit of an odd question so just answer it how you think is appropriate. Why do you publish? (20.43)

Well I am funded by the public. Well I mean, OK it is an odd question because there are so many different perspectives to it. And there is (sic) multiple reasons. One is because it's the nature of science. Science is about exploring ideas, showing what works and what doesn't. So you feel it is a contribution it is your job as a scientist to describe the experiments you ran and what the outcomes were.

The second thing is of course is because it is important career wise and you know that when promotion committees look at you or you are looking to start somewhere else, the first thing they will look at is your publication record.

And thirdly it is a kind of like a foray into the field of ideas so the field is going in a particular direction and you hope to influence this direction in the future because that is what we try to do. It is about trying to find the right way of doing thing. And so you say well I tried to do that and that worked, and I tried to do this and that didn't work well it's a contribution to that kind of global discussion about a community that I also have a passion about which in my case is robotics and machine learning. So it is, how can I put it, that's why you do research its kind of you are trying to solve problems and what point is it solving problems for yourself unless you can show other people how you solved the problem too, so they don't have to go through the same mess and trouble that you went through. (22.46)

Interviewer – Now when you think about your publishing what influences your decisions about where you are choosing to send something for publication. What are the things that influence your choice there?

OK when I publish some I mean I have only published 18 and two patents, so it's not like a huge amount of work, that I have a huge amount of experience at that but things that would influence me is the international reputation of the conference. Is it a conference I'd like to go to anyway so the way the funding works is it's much easier to go to a conference if you have published a paper at the conference.

Interviewer – When you say its much easier you mean it's easier to get the money for it?

It's easier to get the money, it's easier to get support from the university, it's easier to justify all of those things. A second question is whether you are invited to submit, like someone you trust says it would be really good if you submitted to this conference.

Interviewer – and has that happened to you?

Yes once or twice

Interviewer – and have you done so.

So if you are part of a community of researchers and one of the top researchers says we are getting together please make a contribution, I think it's own invitation (?) makes a difference I think. So it is the quality of the conference or it's the quality of the journal, its

whether you get invited…Sometimes you have to shop around, so you will have a body of work that you say I want to publish this now where is the best place to publish it?. So in the ideal case you are not writing reactively. You are doing the research, finishing the research then asking the question where is the best place that I can show people what I did. So sometimes you have basically a paper or a journal paper ready to go and you look around for where is the best place I can publish this.

Interviewer – so you tend to do the research, determine where you are going to publish and then start writing is that usually the process you..

It tends to be because it is so, you might have an idea the research is done and you think where am I going to publish this. But the thing is you need to consider which, … where you publish requires quite a bit of tuning in terms of paper writing. And it is not just at the level of formatting, which is course an issue and annoying but a practical one. But I have the got the issue of community and leadership. I work at the kind of boundary of two areas, machine learning and robotics. And the way I would approach a paper for a robotics conference is totally different for the way I would write a paper for a machine learning conference. There are different background assumptions, there are different subparts of the research that are more interesting to one part of the community than the other, there is different levels of proof and how you show your results are significant to one community and another. So like you said it tends to be done some cool work, I should spin out some papers out of this, where can I publish such papers, here and here and then you write them and submit them and go through the roll up so to speak.

Interviewer – and with your choice, how spot on have you been, what percentage have you been rejected and had to go back again and submit somewhere else?

There have been a couple of … OK. Generally I would say I have a 60-70% success rate. But what tends to happen is you do some research that is in your view constructive, worthwhile, rewarding, but sometimes you can't, you haven't communicated it right. So it tends to be one piece of work that you either get it in first time or you have to submit it two or three times. So its kind of like skewed in one direction. It tends to be good research that will just go in 1st time. Or research that doesn't engage other researchers, or you haven't explained well. If it is a bit oddball have to submit it three or four times. The stuff that is not within… how do I put it. Some of it is tweaking existing approach, whereas other times this is a totally new way of doing things.

Interviewer – and they are harder are they?

Much harder yes.

Interviewer – and do you think that is just conservatism within the field, people saying 'I don't know about this'

I wouldn't say it is conservatives, I would say it is, how can you put it, just, they don't know how to understand… Sometimes it is your fault, it's because haven't explained it clearly. So sometimes you have to put quite a bit of work into explaining and idea or a concept well. And you try one way and you get feedback from the reviewers and you say they have missed the point on this one, so let me try to rewrite it. But sometimes its… OK this is going to be slightly controversial. Within any community, cliques form around particular approaches or ideas. And if your idea doesn't fit into an existing clique, then you don't have people who will advocate your paper and go really hard and say this is really good, because there is nothing in that for them its of course their point of view or is part of their clique. So if something's a bit out of left field and doesn't come naturally, fit naturally in any of these cliques, you won't have any advocates for your work and so people would kind of be a bit iffy about your work because they would go, I don't know how to approach, I don't know how this one fits in.

Interviewer – yes there is the whole body of thought about that issue of changing paradigms

Yes I have read some of Thomas Kuhn's work and paradigms and that sort of stuff

Interviewer – which is what you are referring to. OK good, when you were starting out in you publications, when was your first publication in terms of your career, when you were a PhD student?

Actually I was an honours student – some of my work when I was an honours student got published in a workshop. I mean it wasn't a great publication but it was my first one. That was back in 1996 and I really had no idea what I was doing and I was really lucky I had a mentor.

Interviewer – That's what I'm asking about, how much hand-holding or what form of handholding did you have or instruction or anything?

I wrote the paper I gave it to my mentor, he totally rewrote the paper. And to a lesser extent that still happens today. It's not the content that gets changed its, so this is protected by anonyminity, you won't… OK. So it's the spin. Where the mentor has been…

Interviewer – is it the same mentor?

Yes it's been the same mentor throughout. Other research I've published on my own or with other people, but some particular strands, I have a very longstanding collaboration with my mentor and I have got better at the spin side of things but I still think it is something he's mastered that I haven't quite got yet. And its not the actual content or the research process, I can do that all on my own. What I am not good at and he is amazing at is pitching it to people and getting them to engage with the ideas. And it is really in an academic context the art of spin. How do you phrase this as a really interesting research problem that other people will latch on to?

Interviewer – do you think you are improving?

I think so, I mean I look at my mentor and he is 48, 49 and I figure he wasn't like this when he was younger, so I figure that the spin is the accumulation of 20 years experience. So I am getting better, but not as good as him.

Interviewer – But we have all got strengths in different ways don't we. And you are not at the moment in the position that you are assisting students are you?

Yes I am

Interviewer – Oh you are, and how do you help students with their publications?

Pretty much the same process, but also in my particular case with the students I am involved with I am much more involved in educating them about the scientific process. This is what we need to do, this is science, this is engineering, that kind of question, I would say pretty much the same thing but, also in addition to that is more involvement with the basic science. This is how we set up an experiment. This is how, make sure you evaluate, make sure your evaluation meets the expectation of the community, so I probably have four or five papers which I have co-written with PhD students or Honours students. You can see behind me there is a pile of papers by honours students. Only one of them has led to an academic presentation.

Interviewer – That's their theses?

Yes that's their theses over four to five years so there is probably 15

Interviewer – Gosh I had to get mine all fancy pants bound and so on

Yes that's honours thesis, I've only got one PhD student at the moment, well two kind of. So really two PhD students that I'm involved with on a daily basis. That's a whole new ball game supervising PhD students I'm still getting the hang of that. I did have, I me I think my experience with honours thesis students has given me a little bit about how to be a PhD supervisor, but yes I would typically get a paper from them and go through it. The typical criticism is you have described what you did but you didn't show what was new about what you did. And the other weaknesses that I tend to find with students is evaluation so I think that's one of the biggest gaps for students to cross. It is not enough in a paper to say "this is what I did" the two areas you have to say is "This is what I did different to other people that's new and this is how I showed that what I did is different or better than other people's work". And those are the two key distinctions that I am having to work with most students to emphasise is novelty and evaluation.

Interviewer – And so you were saying earlier that you do your research and then you make a decision where to publish it

Sometimes. You will see a conference, I really want to go to that conference,

Interviewer – what have I got that will fit?

Yes

Interviewer – Well with those students, because you say where you send it changes the way you approach the paper, Do you sit down prior to them beginning and say we might try and send it to such and such a journal or such and such a conference?

Yes

Interviewer – And then do they go off and have a look at the style etc

Yes, typically what would happen is…. With an honours thesis is very different to a PhD thesis. Because you do your best and then at the end of the thesis you look at it and kind of go is this publishable or not and in 14 theses I have had three potential things that are good enough to qualify as publications. Then once you decide that it is worthy of publication somewhere you go OK lets have a look what conferences are coming up Then he will go to the website

I make it a point that unless I was the lead researcher, I think it's an important skill for students to learn to draft the 1st paper themselves and go through that experience. And that is what I would usually encourage. And at the point basically, usually you have to do some pretty hefty work to the paper. But I see it as a form of education is to kind of… It's like case based learning, you can give them all kinds of general criteria about how to write a paper, but until they try to write a paper and you say what's wrong they won't really get it. So I think co-writing papers with the students is an important learning experience.

Interviewer – Just pulling in the questions about, you mentioned earlier that one of the reasons you publish is because it's for jobs and tenure and all that sort of stuff. So what is your understanding of things like impact factors and citations, are these words that are familiar to you?

Yes

Interviewer – So are these sorts of things a consideration for you when you are thinking how to present your CV for example or when you are thinking where to publish?

Yes I think they make a big difference. I prefer to publish small no of high quality papers where possible. So there is usually there is six or seven papers of the 18 that I have that I am really proud of that these are where my heart and soul are. Sometimes you do research and there is kind of spin off papers as well. But I really pride myself on… So I may not have many papers, 18 is not a lot for someone who has finished a PhD four years ago or whatever but I have over 100 citations from those 18 papers. And some of them have 30-40 citations. And that gives me a lot of pride, because you know there is rules of thumb. Only 20% of papers ever get referenced by anyone else so that makes a big difference. Yes I'm fully aware of them

To be honest I have just finished reviewing how do I measure my success. But this is something that I have only started to look at in the last couple of years, career and before

that it was what's a good conference to publish at, that journal said it was having a special issue on that so we will submit to that issue. Now its is much more like what are the best journals in the field. And I remember earlier this year in June going, what's the impact factor of all the journals, what's the impact factor of all the conferences where is the best place to publish? And so I am starting to use that information now. I will say it is more of a recent thing than something I have done throughout my career.

Interviewer – Is that because you are now looking forward in your career?

Well yeah. I have a three year contract. And I figured the time has come when I have done enough research and it is time to step back and look at the bigger picture. I even researched some of the other things like H-numbers and so on.

Interviewer – I am still getting my head around that

It's pretty simple actually its just…

Interviewer – yes I know what it is, it's just how it relates then, how it all ties in. Just moving onto peer review, is that a role you take on?

Yes

Interviewer – and how many would you review, or how often would you review a paper?

Local conferences probably two a year, international conferences probably one a year and occasional journal papers, special editions and so on maybe three a year.

Interviewer – and how long does it take you usually to do a review?

Conference paper usually two to three hours, journal paper probably four to five hours.

Interviewer – And what is your feeling about the time you spend on that?

Kind of unrewarded [half laughs] It's like you put all this effort into trying to understand someone's idea and what do you get? You get your name in the list of a program committee. But to be honest its also been kind of useful because people direct the papers to you that are within your own field of expertise, it can be really interesting way to know

what is going on and you get a good vibe for what is really happening in the research. That is one way to keep up with what is going on. (40.18)

Interviewer – So are you on the editorial board of a journal or a conference committee

I have been on program committees but I haven't been on editorial boards.

Interviewer – And is being on a program committee, is that quite …

Not really, I mean typically for some of the conferences I go to there would be 100 people on the program committee. It's basically everyone who reviewed a few papers.

Interviewer – So your role there would be as a reviewer of a few papers rather than a decision maker at some other level?

Yes you would typically have the program chair, the area chair and then the program committee. I have never been an area chair, I usually get a bunch of things to review.

Interviewer – Would you like to be is that something you will probably do in the future? Is there status associated with doing something like that career wise?

I think so, I think so. But it is status within community, which may not translate to job progress. And having helped organise conferences and so on, it's a lot of effort for not a lot of reward. You do it because you love it not because it makes your career, improves your career prospects that dramatically I'd say.

Interviewer – So I assuming from your description there that you have not been offered anything, any compensation for your time for reviewing

No, I mean I don't know of any journal in Computer Science that would….

Interviewer – I have not come across anyone who has although publishers keep insisting that they do [laughs]

Maybe for the editors, there's an honorarium, I've heard of some of the editors getting an honorarium but it is in the order of $500 or $200 per edition which is like, given the amount you have to put into it is not that considerable.

Interviewer – yes I have yet to speak to a real person who has had some money. We have talked a bit about open access, so obviously you are pro the concept of open access?

Yes

Interviewer – And you have also published in open access journals?

Yes, not only that but I make my, one of the artefacts of computer science research is software, I make my software available as open source. So that basically means anyone could download my software and reproduce my results. The results of my PhD work are released under something called a GNU public license. That is something I would encourage. I should also mention I use other tools by other researchers that are also released under the GNU license that every time I use them I am amazed by how good they are. In machine learning – giveka (?) that came out of wakardin (?) university. And in robotics there is Player, so both of those tools. In Computer Science it makes a big difference to be able to bypass all of the practical development issues and get to the research question. And that is what other people's open source tool kits have helped me to do.

Interviewer – the last thing I want to talk about is something that has been instituted at universities worldwide and Australia wide called institutional repositories. Is this a term you have heard before.

Yes well I know at [institution] there is something called a digital thesis project.

Interviewer – Yes that's one, [identifying information] The idea is ultimately to tie it in to the reporting process of the university. Is this something you would feel comfortable putting your material into?

Generally yes.

Interviewer – They tend to work under a Creative Commons license

Yes I don't have a problem with it. Like I said I figure I have been funded by government so that means the public has some entitlement to the work I've done. My issue with that kind of thing is more of a practical one. I mean it is so easy for me, its easy for me personally, I

don't know about other researchers, its easy for me to maintain my website. And do that anyway. Since this is anonymous I will just say it. So the university has a digital theses project, but I can't see the point of putting my thesis on the website when I have a copy on my own and if I find an error or… actually I probably wouldn't modify it, but if there was some kind of typographical error, I would be in a position to correct it.

I should say I don't just make my software open, but in many cases I make my data open as well, and to some extent they wouldn't know what to do with some of that data. So its more a practical concern about these institutional repositories actually being able to be kept up to date and getting into a format they are happy with when I can just do that myself and if I collect a new dataset, it will take the institutional repository 6 months to update it whereas a person visiting my website can see it. So it is more an issue of practical control over conceptual objection. But just having dealt with libraries in the past it is sometimes easier to just manage it yourself. But I do some of those things anyway and [institution] has some policies about research records, notebooks and all that sort of stuff anyway, stuff has to be archived. [identifying information].

Interviewer – [identifying information] Well that is great that's everything I wanted to talk to you about. Now I'm asking everyone, I'm happy to go away and never speak to you again, but if you are interested, if I do create something that is not a whole thesis would you like to know about it?

Yes of course I would like to know what comes of this research

Appendix 4c - Full transcript of interview: Chemistry at university B

(20 March 2007)

Interviewer – I'm interested in talking to people about their interaction with the literature. So what I will be talking about is you as an author, you as a reader and you as a reviewer of literature. That is what I'll be talking about, but usually the first thing I ask people, and I have been given a clue by walking through you lab, is what is the nature of the work that you do, how much is sitting in front of a screen, how much is interacting with people, how much is interacting with the substances you are working with?

Well I don't do any experimental work myself, even though the area of work I am in is experimentally based. So all of the work that is done that is published is done through the hands of postdocs, PhD students and honours students although to a lesser extent. And so I am in a dialogue with those people in my group on a regular basis. So we talk about the research and plan the research together we talk about the results of attempts to implement research ideas and those students or postdocs will go back into the lab and try to modify experiments.

So none of what I do involves experimental hands-on work. But I am intimately involved in interpreting the data that the students and postdocs are generating in the course of their laboratory activity and I write grant proposals, I write up the manuscripts and look at drafts of PhD theses and make fairly detailed comments on those as the students develop their theses. So those are the sorts of activities I m involved in. I sometimes jokingly call myself a Microsoft Word chemist because I guess I spend as much time manipulating draft proposals and manuscripts as anything else.

Interviewer – If we move on to you as a reader of literature, how do you keep on top of the literature?

I'm not sure that I do [laughs]. There is a huge volume of material. But broadly speaking, I keep on top of the literature as best I can. I read regularly skim the key journals in my area.

Interviewer – And do you go to them or do they come to you?

I go to them, with the exception of a couple of general journals like *Nature* and *Science* which I have subscriptions to or I share a subscription to them with my colleagues.

Interviewer – And that's the hard copy?

Yes the hard copy. Because we like reading the hard copy. And then we have to a lesser extent than we used to the hard copy of certain journals coming into the library. Although obviously the university policy is if we get an electronic subscription, you don't get the corresponding hard copy. So what that means is for the journals of slightly lesser stature, I am tending to go into the library and read the hard copy as it comes in, just spend a few hours each week in the library, normally in one block sitting down and reading the journals as they are coming in.

Interviewer – And this is the Chemistry library?

Yes we have a library is this building, and it is a very good one I might add. Then normally on the weekends I do two things. One is I go to websites of the key journals in my area and browse the contents and chemistry is very much embraced the idea of graphical abstracts and identify those articles of greatest interest by skimming then print out hard copies of those. Then either read them at the time or collect over a few days and take them home and read them.

Interviewer – And do you keep an electronic version?

Yes normally although always, because the other thing I was going to tell you about it we have a very good chemical database called SciFinder which you may be familiar with, run by US Chemical Society. Often it is actually easier to find an original paper just through a search. I don't keep that many electronic or hard copies of papers these days because you can find them de novo by just going to the database. Key papers I keep.

Interviewer – So once you have printed a paper out and read it, what do you do with it then?

Well I, normally the way I operate is I am running files in all my projects and I insert that hard copy into the relevant file and often that file gets winnowed down as we work on a project continues to a file of the paper we are producing from that project.

SciFinder is such a powerful tool that I don't as I used to, I don't any more conscientiously keep copies of everything and file things as I used to. Not because I am getting old and slow but because the database is just so powerful. You can find things very quickly

Interviewer – And so are you talking about topic searches on SciFinder?

Well it's a combination of topic searches, author searches and what we call substructure searches.

Interviewer – And what do you get when you, what comes up, can you click through to the actual paper?

Occasionally, but not always obviously that would be nice to do but not necessarily from SciFinder it's not necessarily so easy.

Interviewer – So what you will find is you will get the full reference at that point? And where do you go from there?

Then I go to the website the journal is published at.

Interviewer – so you are not going via the university library?

Yes I'm going in through the university library, so I have the university library electronic journals segment bookmarked so I go straight to that then I go straight to the journals.

Interviewer – OK so do you find you ever hit a point where you can't find a paper because it doesn't subscribe?

Occasionally but, um but just to take a step back because I think this is an important point, SciFinder is one of two tools. The second one is Google because often Google and SciFinder are complimentary. Sometimes some of these more modest journals you can find through Google and get free access to them. So just because the library does not have a subscription, it doesn't mean you can't get it through other means by doing a little Google searching. It is not foolproof, you still get stymied every now and then by not being able to get hold of copy of an article that's very rare these days, very rare.

Interviewer - So if you get to that point where you can't get a copy because we don't subscribe to it, would you keep pushing or would you give up? (8.01)

It depends on how important the particular article is. There is a bit of stuff in the Chinese literature that I find is hard to get hold of. A bit in Russian literature, but it is pretty rare these days not to have access by one means or another.

Interviewer – When you get hold of Chinese literature is that in Chinese?

Often, but the chemical structure, I don't read Chinese, but the chemical structure and schemes are in standard chemical format, so you can often read these articles and get a fairly strong sense of what is in them.

Interviewer – How long, in pages would the average article be?

It varies from four, four pages is the traditional length of the communications, two to four pages is the standard length,

Interviewer – and how many images?

Again it varies it another rough figure. In a four page communication there would be four to five figures, schemes.

Interviewer – so the bulk of the information is contained in the images

And/or the surrounding text. And of course many of the images these days have substantial supporting information, documents supporting them and they can be very large indeed and often we have to consult those. So the communication is often the front end of a much more substantial document, and sometimes you do have to drill down into that supporting information. I guess there is a variation there. It depends if you are interested in and article for the concepts or if you are interested in the article for the technical detail. It depends on the specific purpose that you are honing in. If it's for the concepts or principles you probably don't need to go to the supporting information but if you are looking for specific technical detail then often you will have to do that.

Interviewer – So if we just move now from you as a reader to you as an author of material, when you are designing an experiment and working through the experiment with your collaborators, at what point do you make the decision about where you are intending to publish something?

It varies a little bit. If we think it is a good idea and very early on we get proof of concept then we talk fairly quickly about the high-end journals. If things aren't working out as planned, but there is still useful material emerging then we will probably go for more

mainstream journal, and probably a full paper rather than a communication. It varies an awful lot I'm not sure I can give you a standard formula.

Interviewer – OK earlier you were talking about communications being the four pages, and that's distinct from a full paper is it?

Yes

Interviewer – OK so in your work, what sort of percentages would you have as full papers and as communications?

At a round guess about 50/50%

Interviewer – And is there a sort of status associated with a full paper or a communication? Do they have different roles? What is the distinction?

Yes they do, a communication obviously is a more rapid form of publication. And more and more these days people are scanning the chemical literature at least looking at communications more than at full papers. Full papers can tend to be mechanisms for depositing your information and often we will follow up a communication with a full paper in order to get all the experimental details out there and possibly additional experimental work that wasn't disclosed in the original communication. I don't want to denigrate full papers too much, because they play an important role, we all recognise the value of full papers which are chock a block of experimental analysis and detail whereas communications tend to be the highlights.

Interviewer – So would most of the information that you put in the final paper the big paper, would that have been in the supporting material of the communication.

No that is not what we tend to do. Certain forms of communication have this opportunity to co-publish supporting information and if we have gone down that track we would argue that the package of the communication and the supporting information is in one sense a bit like a full paper. But there are other journals that don't require supporting information, and we might publish there first and then follow up with a full paper which expands upon the material in the original communication, to which we have added all the experimental detail. (14.46)

Interviewer – So is there a difference in the time to publish for the two?

A little bit. Communications tend to have a quicker turnaround.

Interviewer – Of how long?

Six to 12 weeks.

Interviewer – and that is for you to find out if it has been accepted?

No everything, submission through appearance on the web. Six to 12 weeks, sometimes shorter than that. We have published one paper that I submitted, it was accepted in one day, we got the proofs three days later it will be published in less than one week having gone through the full referee and proofs process.

Interviewer – Wow that is amazing

A lot of that is highly automated these days. I am amazed by that too, it is more the exception than the rule, it is quite striking, it is something that has happened in the last few days.

Interviewer – And what about a full paper?

A full paper is a little different it depends on the journal but certainly at least 12 weeks and it can be up to 24 weeks.

Interviewer – so it is still within six months,

Yes, chemical publishing and I'm sure in other disciplines, is such a competitive activity that journals dine out on how quickly they can get something that is submitted, put it through the refereeing process and then publish it on the web. So six months might even be a little bit outside the boundary. I would say 16-24 weeks is a typical timeframe for a paper in chemistry, at least Organic Chemistry. That's the other thing to be aware of this is organic chemistry and there is a distinction you need to be aware of.

Interviewer – And how long would a full paper be?

In terms of printed pages?

Interviewer – yes

Oh, it can vary but it normally wouldn't be longer than 20 pages tight packed double column.

Interviewer – And the images would be in there?

The images and the experimental information as well, so communication is 2-4 pages and full paper 20 pages. Again very rough figures there.

Interviewer – Which factors come to mind when you are thinking about which journals to send the paper to?

The profile of the journal obviously. How much hassle or otherwise getting things into a particular journal. I don't like double handling so I tend to aim for journals that I am pretty confident things will get into. My argument being if it is sufficiently significant piece of work, regardless of the forum, because the search tools are now so potent if it is significant enough it will get picked up. I don't like because of distance (?) it is an impost on my time and I have a Research Assistant or the chemistry school has a research assistant who helps us format papers for submission, she's just fantastic at that. I don't like having her double handling things, if it has been rejected it has to be reformatted for another journal it is double handling, it is an inefficient waste of time. (18.49)

Interviewer – So what is your hit rate like? How often do you get rejected?

5% of the time I suppose.

Interviewer – So pretty good.

Yes. I am pretty disappointed if something gets rejected. Anyone would be but I'm trying to make a balanced decision between the ranking of journal and the likelihood of acceptance.

Interviewer – so the ranking of the journal does come into it?

Absolutely yes. I am a mainstream organic chemist and the highest ranking journal devoted to organic chemistry is called *Organic Letters* published by the American Chemical

Society. That is typically where I publish my most high quality work, what I consider my high quality work. And it is considered the highest ranking journal in organic chemistry.

Interviewer – if you cast your mind back to where you started, when you started writing papers yourself, did anyone give you any instruction on how to write a paper itself, and which journals to submit to and how the journal ranking system might affect your career. How did you find out about those things when you were starting out? (20.17)

I started out a long time ago. When I was a PhD student my supervisor would write the papers, let me have a look at them and we would argue the toss about various things but he did all the writing. I think the fascination/obsession with rankings of journals was much less a matter of concern when I was doing my PhD, this was at the formative time of my career, when all these things were being considered. And my PhD supervisor who was a wonderful supervisor, and I would have a long discussions about which journal we might consider submitting to, the chances of getting into that particular journal trying to be reasonably pragmatic about our chances of getting into one journal or another. I guess my own pragmatism about selecting journals comes from that time.

Interviewer – so that was quite good instruction then?

Yes he was certainly very good about instructing on all these matters and I like to think I do the same with my own students.

Interviewer – Well that is my next question, now you are responsible for the germinating careers of youngsters, what do you do with them?

We talk about how we might package the work they are doing. I say to my students there is a real rigour that comes with writing articles for journals and if we do that writing ahead of the production of their thesis, that essentially the article could become the backbones of a particular chapter in the thesis.

It also forces both of us, myself and the student, to think deeply about the research. How we argue particular concepts and reasons for doing certain things. It also forces us to get our houses in order in terms of the experimental work has been probably completed, there aren't any gaps missing that haven't been detected in a reasonably timely fashion. So I like, and I think the students like the process we go through talking about the paper, talking about how we are going to present our arguments, the structure of the paper, how

it can become a valuable skeleton for a chapter and how it defines how me might move forward with the remainder of the research. I find it a very important process for all sorts of reasons.

Interviewer – so why do you publish?

You can't, for a whole range of reasons, but I guess more fundamentally than most, you can't beat the rigour of writing a paper and submitting it for peer review. You have got to get your, you are using tax payer's dollars to support your research. We are obliged to publish what we do. And it provides a rigorous conduct in which to work. So those would be key things and of course if you don't publish you perish in the granting system, so that's rather critical as well, but that is a lower level of consideration than the other ones I mentioned. I suppose the other reason that I would add to that list is we think it gives us an international profile. It means that if we get it right, the research of the group is respected and it assists with my students and graduates securing employment. That's another reason.

Interviewer - What is your understanding of the copyright status of your publish work?

Now there's a question [laughs]. Normally we assign copyright to journal. That's the typical arrangement in most chemistry submissions we sign over copyright to the journal.

Interviewer – So do you ever give, either put copies of your work on your website or send them off to people who have requested them of you?

I don't put on the website, we are not allowed to normally do that. I don't have a website to which people can normally go and there is a pdf of ever paper, far from it, there are links to the journal. Typically the journal will send you an electronic reprint which you are allowed to disseminate to people who make requests of you, often there is a limit of 20 electronic copies that can be sent to people who make requests.

Interviewer – And do you get any requests? (25.50)

Yes, we would never get 20 requests. Again, most people would have access through their own libraries and can download directly. Typically these days we get reprint requests from third world countries that have more modest library facilities than we do. That's not to say that other people from first world countries, we know from looking at download

statistics of various journals that some of our papers are getting a lot of downloads. And that is coming through, obvious people looking at our publications through their own library systems.

Interviewer – Lets move onto reviewing. What sort of refereeing load do you take up?

Too much [laughs]. I'm chair of the editorial advisory committee for [journal name] at the moment and I am called on by them to do a lot of adjudicative refereeing when they get a split decision from the normal referees. I have to weigh up the judgements of two or more referees and essentially make a ruling on what would happen to the paper that has fallen into that particular no man's land.

Interviewer – and how often does that happen?

Once a month perhaps, something like that.

Interviewer – So that I am guessing would be a greater burden than a normal review?

Yes because I have got to review the reviewers as well as the paper itself. Then I have normal volume of stuff.

Interviewer – And what is the normal volume of stuff.

Oh every two to three days I get a request to review something. I don't accept them all of course but that would be the normal rate of request.

Interviewer – and are they requests for full papers or communications

A combination of both.

Interviewer - so how long do you usually spend… I'm just trying to get some idea of how much of your time is spent doing these things.

I would normally spend an evening, or a good part of an evening, reading it reviewing and writing report. Of a standard paper.

Interviewer – What about these ones where you are an adjudicator?

Oh that could take half a day at least. And if we are talking about reviewing review articles which are often very substantial, that can take days.

Interviewer – so all up its quite a few days of your year

Oh absolutely

Interviewer – So how do you feel about that time you spend on reviewing?

It's kind of a quid pro quo I guess. I can't be submitting, we publish close to 20 papers a year. And obviously that means there are 20-40 or more reviewers out there who are looking at our papers and reporting on them. So I guess I feel there is a quid pro quo there, I have to contribute to the community of responsibility for doing reviewing.

Interviewer – And have you ever had any remuneration for the time you have spent in recognition at all? (29.36)

Not reviewing journal articles no. Theses and grant proposals is another matter, not journal articles.

Interviewer – so you do get paid in some way for theses and…

Well is that coming into the mix? I have a PhD thesis from another institution at the moment.

Interviewer – and they offer you and honorarium?

$300 or something and grant proposals which I review there are some organizations which pay you to do it. ARC included if you are an Oz reader, but that is only to establish a contractual obligation.

Interviewer – Have you ever found with your reviewing that, it goes both ways I suppose, that you have had a bad review, and by bad I don't mean they have said your work is bad, but the review itself seemed to be a bit off, but by the same token have you reviewed something and then you have seen it published. Like something where the system isn't working, has that ever happened to you?

I wouldn't say that the system isn't working. I guess what I sometimes see is I recommend rejection and yet it gets in and I think gee that was pretty marginal, I am surprised that surfaced. But obviously there were other reviewer that have recommended publication instead of rejecting as I have recommended. There is another interesting dynamic that comes into play that you may be aware of but I will make a comment on. Many chemistry journals keep an eye on the propensity of a given reviewer to recommend acceptance or rejection. So many journals establish profiles for their reviewers and I have a feeling that when the editorial staff of a particular journal look at something and say we think this is probably a bit marginal why don't we give it to a reviewer who is likely to reject it rather than accept it, or vice versa, we think this is fantastic stuff, we will send it to reviewer X because their record shows that they tend to recommend acceptance more than rejection. I have a sense that some journals try and manipulate outcomes. I don't want to get into a discussion about whether that is ethical or knot but they certainly do, I know they keep profiles because they often send out a profile to you at the end of the year. You will often get an email with an attachment which says you reviewed X papers and rejected Y of them and recommended acceptance of Z of them.

The other thing that is an interesting phenomenon for researchers in the southern hemisphere in chemistry is you can guarantee that you will get more requests for reviewing in the northern summer months when the normal cohort of referee is not available because they are on holidays. So you tend to see a lot more requests for reviewing for northern hemisphere journals in the middle of the year.
33.30

Interviewer – In general, I know it will vary from journal to journal, but how many people would referee a particular article?

It is highly variable, it can be simply editor or the subeditor and no more than that through to four or five reviewers depending on the quality of the journal. I think there is something of correlation between quality of the journal and the number of reviewers used. The higher the quality of the journal the more reviewers are employed to make an assessment of the submission.

Interviewer – Are you familiar at all with the expression open access publishing?

Yes

Interviewer – What is your understanding of it?

Well I think there are two variants of it aren't there, one is that it is a journal, a normal journal with refereeing associated with it but there is no charge, it is put on the web, there is not normally a hard copy form. So it's a reviewed journal that is free to air.

And in another variant, and I am no expert on open access publishing, and another variant it is both free to air and there is not really that much vetting of it. It people can just put onto bulletin boards almost electronic versions of papers.

Interviewer – That is a version of open access but it is not what I am referring to. What you talked about at the beginning is more what I am talking about. And there are actually two paths there is that way of publishing in an open access journal or there is a secondary path where with publisher permission you can put a copy of the pre or post print of the work up into either your web page or an institutional repository. Have you heard of this expression institutional repository?

I have heard it discussed.

Interviewer – Were you aware that there is one here at the ANU?

I am aware there was one at one of the universities in Queensland. I think they were trailblazing weren't they and we followed suit to some extent. So my answer to that was yes I was aware of that here. But I am also aware, I think I have this right, one of the smaller universities in Queensland…

Interviewer – You would be thinking of the Queensland University of Technology.

Yes that's right, QUT has been very proactive in this.

Interviewer – yes they have made it mandatory to put things in.

Yes

Interviewer – So it would appear that is not something you have considered doing, putting things into an institutional repository here?

No, not for any particular reason, it is just another step that I don't see as being of significance to the way I interact with the outside chemistry world. It wouldn't give me an advantage beyond anything I might acquire through the conventional publishing process. Because all the colleagues that work in the same field as I do have access to the same searching tools and access to a broad library of their won institutions, so I don't think I would gain an advantage in terms of increased exposure to my colleagues. I wouldn't project any further than I do now through the tools that are available to most of my colleagues. At least I don't think that I would.

Interviewer – My understanding is that one of the journals you publish in a bit, ARCHIVOK, as far as I understand that is an open access journal?

Yes

Interviewer – Is that in any way a consideration when you send something there?

Not in the least. *ARCHIVOK, a*lthough the reputation is improving, it was originally created and stated as such, created to essentially be a repository for experimental work that might not have gone long way but there are still some useful results from that work. It possibly couldn't be published in a more conventional form and this was a vehicle for getting some information that might be of modest significance out there because it might be of assistance to some colleagues in field. I mean we can't always predict what will be the most valuable use of our research is, in our hands it might not seem important but in someone else's hand, because they are looking at things from a different direction it could be very important.

And again, if the work is done properly and carefully and presented adequately, we have a responsibility it to get it out there. The funny thing about ARCHIVOK is it is evolving and becoming more of conventional journal with more of the conventional hurdles for publication. So ironically it started off as a repository/OA journal and it now has all of the accoutrements of a more traditional journal. So it has evolved in an interesting direction.

Interviewer – But it has continued to be.

It is open access still, but its aspirations have changed because I guess the impact factor game is important for everyone. You can't ignore that.

Interviewer – But it still, it doesn't charge a pay on submission fee, you as the author don't have to pay?

No its free to air for everyone, including the authors, there are no page charges or anything like that and it is a strictly electronic journal.

Interviewer – well that is all the stuff I want to talk about, I am offering to walk out the door and never bother you again [both laugh], or when I produce something that is understandable and not a PhD thesis I am happy to let people know if you would like to…

Yes, I would, just to see, I don't want to monitor what you are doing just see how it fits into the big picture. I would like that thank you

Interviewer – well that is great thank you very much for that

My pleasure [end of tape]

Appendix 4e - Full transcript of interview: Sociology at university B

(15 February 2007)

Interviewer – I will just give you a quick background of what I am doing. I am interested in the changing research practices in Australia, and particularly in terms of people's interaction with the literature, both as a researcher and as an author. And this in light of the move towards making information more publicly accessible. So the way I am structuring my research is I am doing a comparative study with the ANU versus the UNSW – so two institutions who are at different stages of their administrative areas and I'm looking at three disciplines which diversify a lot in terms of their publications methods, so Sociology, Computer Science and Chemistry and they have different emphases in their publishing outputs.

Yep they sure do.

Interviewer – So I am comparing those to hopefully get some insights into the differences between disciplines but also some insight into the differences between universities and I will then do a triangulation of that with QUT university who have instigated various things in their university to see if they have had the experiences that I think they should given what I have found

Right OK, [laughs]

Interviewer – so that's how its all going to work [laughing] hopefully it will be fabulous. So what I am asking people to do initially is basically give me a quick run down of the breakup of your work the percentage of time you would spend, and I understand there is a difference between term time and non term time, in your teaching your administration and your research. And with your research what form that takes.

Hmm. We it also depends on where you are in your biography too, because your output is pushed by your hunger for tenure for a job or a job full stop. So early in your career you will be slamming out anything on the back of a bus ticket and giving it to anyone who will take it. And the advice I would give – I will just rabbit on and you tell me to shut up if it is not relevant – the advice I was given when I was a young scholar was publish anywhere, anytime and start leaving it off the CV as you get more mature and highlight only the good internationals. And I think that is probably generically true. I don't know how many

people start leaving things off but I certainly do. I have things published that were run off on Romero presses that you wouldn't want to own up to any more.

So that's part of your output push. And I guess the more straightforward answer to your question is about three years ago I did a Bureau of Statistics work diary, which is a time diary over six months, which involved phone interviews and keeping a time diary and they reckoned I was working 65 hours per week. And at that stage I had 3 books back to back. I was writing one, proofing one and doing something with the third. That was just a nightmare. If you look back at that period that was every night of the week and every weekend working on publications.

Interviewer – so not the time you were spending here.

No not writing those three. I'd come back here to work at 9pm when the kids were asleep and work through until about 2am in that period. Whereas at the minute life's a lot quieter. I am doing the second edition of a textbook and I'm pulling together an edited collection together of a conference I ran last year. So the pressure is not as bad. But that would still involved most weekends writing or trying to write.

Interviewer – and with these, the impetus to do this work is that self directed or, why were you in a situation where you had three going at the same time?

I have an inability to say no.

Interviewer – so somebody else is asking you?

Well putting together a book is a long complex process, approaching commissioning editors and publishers and putting a proposal to them. So if one of those, the text book for example, went through five publishers before someone said yes. When somebody says yes, you can't afford to say no. And with the other one, *[book name]* with a couple of my colleagues here was purely serendipitous. We were having a cup of coffee and we said let's write a book on [topic]. And the third one at that time was an international dictionary of social sciences and because it was a text book the publishers put it to me as something to do. And again you don't say no.

And you don't say no because it is called packing a parachute – we live in perilous times in academic life and if your publication is not up to date you are in trouble. And it keeps you

geographically and socially mobile. So if you want a chair in [city] or [city] you have got to have it. So there is a lot of inner drive for it, which a lot of colleagues don't share. Because the other option is you get appointed and you sit back and relax which is increasingly impossible but you can still do it a lot easier than I do it.

Then having done all that you have the problem of uneven publications. So, I was interviewed for a chair just before Christmas, and notwithstanding the seven books and 40 articles and chapters and Christ knows how many seminars and conferences the first question was "why has your article production slowed down?" And I said look I have just written three books and he said "yes we understand that but your international profile has got to be stronger, you have got to"… far out! How much work can you do?

Interviewer - Can I ask who this was?

[person identified]

Interviewer – and do you know what his background is?

Yes he is a psychologist.

Interviewer – OK and he's not in a dissimilar..

There is a great deal of professional boundary stamping around psychology and sociology.

Interviewer - I was just thinking it is not like he was a physicist or something

No no, But he would be a behaviourist and he would be a positivist so he would only think that things that were data driven and internationally published count.

Interviewer – Interesting. You just mentioned before that the book went through five publishers. So you had written a proposal for a book?

Yes

Interviewer – so can you explain that process to me (7.15)

How did I do it? I teach [course name] as an undergrad course. And after about five to six years of polishing the lectures it occurred to me that this was now looking like an intro textbook. So I literally joined all my lecture files into one big file and began working across is and writing introductions and smoothing over building up evidence, getting research for ABS stats, because it was socioeconomic effects of illness, who gets sick when where how. Ethnic patterns. So I built it up. And the publisher likes to see about 3 chapters complete and the introduction as well as a detailed Table of Contents.

I sent it to Allen & Unwin, thinking that an Australian publisher would like it but they didn't they said they had moved out of the text book market. And then it went to Melbourne Uni Press and they didn't like it.

Interviewer – did they say why?

Yes, they didn't like text books either. Which is quite odd. Then Sage International in London took it in the end. Then it became by academic standards a good selling book which is why they want a second edition. It sold about 4000 copies which is not ever going to make me rich but it counts for a decent serve.

Interviewer – and what sort of period of time did that cover, how long did that take. Like years?

Years, oh yes, years. Because when you send a book to a publisher they can sit on it for six to seven months before they decide they even want to have it refereed. If they decide to have it refereed and it goes out that's another six months and there is the writing process to finish it all off then there is the sub editing process to clean it all up afterwards and getting the index done. It's a huge job, it's a long haul. I could find the first file with the first submission somewhere eon my hard disk but it can take three to four years.

Interviewer – so three to four years from when you first sent it to Allen and Unwin to when it finally was published. Alright so what about journal articles, that was you trying to get a book published, What sort of difference was there when the publisher approached you and wanted you to write a book what time was that?

That was two years.

Interviewer – does that include the writing?

Yes but I worked hammers and tongs I tell you Danny. It was a dictionary. A cross over between a dictionary and a sort of encyclopedia. It was very hard to do but it was quite doable because every entry was quite discrete and I wrote all the entries that belonged together, so all the history of medicine entries I wrote in a row and all the profession of medicine entries I wrote in a row. It was a lot of work. But it was two years it was much faster because they knew what they wanted and I knew what they wanted. So I put together what they call headwords I put together a list of 900 by going through all the textbooks to do with health and social sciences and then I wrote up the entries for maybe 30% of them. Then they sent it out to referees who added words and deleted words or suggested things. But in timeframe terms it was much quicker. But they forced me to write fast. I was a bit sick by the end of it. (11.24)

Interviewer – so with your journal articles, your experience there, what is the, in your experience, what sort of timeframe have you had with journals.

Most would take a year. There are spectacularly long lead times involved in publishing, which is why you need to keep so much in the drain. The biggest internationals are the best they will tell you very quickly whether or not they are interested in refereeing it and they will referee fairly quickly,

So I have got a handful of articles in a couple of the big journals. And once you have written it, writing will take a semester because it has got to be research based and most of my research based work is documentary, I very rarely leave this office. Because I can do it on the basis of public documents and government documents and publicly available stats and just use them to develop an argument about the state of general practice in Australia or, what else have I done, I can't think.

Interviewer – [laughs]

I actually have to look up my own CV to know what I am doing. Anyway it would be a documentary based form of analysis. I very rarely do interviews or observation or qualitative stuff. And they will come through fairly fast. The smaller journals are the worst. And so I always send my work international first and I have a reasonable hit rate at it actually.

Interviewer – and so you are making a decision on where to send it partly on how long it is going to take?

Yes. If I sent to a paper to *Labour and Industry* which is edited out of Deakin, you can be virtually guaranteed 18 months. Part of it is because they are small and they don't have the administrative back-up of say *International Journal of Health Services* does. And they don't have a pool of referees to draw on. So part of it is built into the structure of these small presses. And the other part is the Australian cringe, which is alive and well. So the paper on general practice I sent to *Labour and Industry* and they turned it down so I sent it to the *International Journal of Health Services* and they took it with almost no revision. So it's better to be refereed internationally because you don't run into your colleagues.

Interviewer – even though it is supposed to be blind refereeing, do you think even at the editorial level before it gets sent out to referee?

It's a very small pool in Australia. There are only five to six people designated health soci…. oh that's not true there is more than that, but there is only five to six at the top to put it bluntly. And we would be refereeing each other's work endlessly. You can tell who has come in. You know their areas your know their style, you know their writing.

Interviewer – and are there big philosophical differences in your approaches? Are there points where you know if it goes to Dr Jones they are going to say no because they don't agree with your point of view? (15.00)

No, that doesn't happen. The market breaks itself up. Health Sociology Review is the national journal for Sociology of health and it doesn't have an epidemiological or a quantitative bias, its pretty independent. But you wouldn't send in something based on population statistics analysis, it's not their cup of tea. But you would send it to the Australian journal of public health. And so where there are epistemological divides between the disciplines you don't be silly. You don't send stats to the qualitative people and you don't send a qualitative account of women's breast cancer to the ANZ public health people its not their cuppa.

There are different networks of who publishers with who. So I am in a network built out of Melbourne and Sydney. [details of the people working with] So the field looks after itself. There is (sic) no bad feelings around all of these issues.

Interviewer – Now you mentioned before about conference papers that were not in your list

Oh, I just sent you my publications list.

Interviewer – no, no that's fine. What are observations about conferences?

A waste of time, I loathe them. I try and make a rule to do one every two years.

Interviewer – why is that?

To keep your profile up. People want to know you are out and about you have got one head and you can stand up and not be pissed at 9am. And I know some academics who are. They also want to know your work has international standing.

Interviewer – And who is they? Your colleagues?

Your employers. I've been to [university] last year there was the DVC Research the DVC, the VC social sciences, the head of the school of social sciences and two outside professors. They is a big bunches of boys with big dicks basically and they want to know if they take you on board can you give plenary sessions to national bodies, can you travel overseas and talk in public. So I do that and I have done three plenary sessions for the Australian Sociology Association. Which is worth doing – because that counts. An invited public address is very different thing from a 20 minute poster edition in the foyer. And with my work with [name], he travels internationally a lot so he presents our co-produced work overseas so I can claim to have international visibility at a whole host of universities overseas in Canada, Europe, Britain.

Interviewer – and do you get publications out of that?

No, its not worth it. The last time [name] and I worked together, it was about 18 months ago we got 1 co-authored journal paper and two book chapters in an edited collection. That's a far better place than conference proceedings. Because even though conference proceedings often they are refereed everyone knows it's you know, part of the game. I think it is a serious error that a lot of young scholars, particularly young women make, they think that giving conference is what it is about. And often you see their CV and they will have over 30 conference presentations but only two publications. And you will say, it's not about going out and talking to people and having cups of coffee.

Interviewer – you mentioned when you first started out that somebody mentioned to publish everywhere. So you have partly answered the question I am about to ask, but when you started out what kind of formal or informal assistance were you given in how to write a paper and where to send that paper.

None

Interviewer – None? So what happened?

When I was starting out I had a friend a couple of years ahead of me, who was doing his PhD. He used to keep on his desk a copy of Ulrichs. And Ulrichs is the international classification of journals by subject and title. And [name] was a spectacular publisher. Spectacular. And what he did, everything he wrote he went through Ulrichs until he found someone who would publish it. [laughs]

He put me onto a little journal, I will show you because it is so badly produced it will show you exactly what I mean. He put me onto a little journal published out of the University of Manchester in Britain. And look [showing it to me] they didn't even edge the pages, [laughs] its stapled together, it's tiny font. But that was a multidisciplinary journal and the guy who edited it was big, David Lamb(?) big in the history and philosophy of knowledge and of medicine. And they really liked the stuff I was doing, so that gave me, I got three papers. 1988, 1992, very early in my career, [identifying information]. So once you find someone like that who likes what you do and is prepared to publish it, that gives you added confidence and you start sending it to bigger people and you get lucky. My PhD was in [identifying information] and University of Adelaide had a little journal of South Australian studies or something. And they took a very long paper from me which established my profile with historians which allowed me to get my first job. And that was dead lucky I just sent it to them. Because I had seen a copy of the journal lying on a shelf. And then you start trying to stretch your wings and start to go wrong. So I went for *Science and Social Medicine* which is the biggest international, and got roundly beaten up, very roundly beaten up. Which teaches you an awful lot about what you can get away with saying and not saying at that level. No I didn't get a leg up from my PhD supervisor, it was pretty much 'this is bird bath now you learn to swim'.

Interviewer - So now the shoe is on the other foot. What do you do with your students in terms of, do you have PhD students?

Nine of them

Interviewer – so do you give them any advice, are you involved in any formal or informal instruction now you are at the other side?

I like to see my PhD students get two journal articles out of the thesis while they go. Because once its in the acknowledgements in the front of the thesis it gives the thesis a phenomenal legitimacy in the eyes of examiner, even before he or she has read the first page, and that's why I published, I managed to squeak my early articles into my acknowledgements page. That shows the examiner enormously about what's going on in the thesis, especially if its not smack in their area.

Do they do it? Let me think, [name] did, I don't think [name] has, and she's just about finished, but her case it doesn't matter as much because she, [identifying information] so she probably won't work in a straight academia. [Name] converted his thesis into a book within about six months of finishing. So you give them a lot of moral support but you can't actually make them write it. And you tell them strategically this is a good thing to do. And strategically getting an international conference paper out is good. And at a PhD level if that conference claims to be a 'refereed' conference and has published proceedings that's extremely good.

Interviewer – even though you know its rubbish?

Well we don't think its rubbish at PhD level. We think its rubbish at senior lecturer or professor level if you are citing your conference publications. But at PhD level its critical. I have a student who is studying [identifying information]. Now that is great kudos. To be invited and paid for, it came out in refereed proceedings. And it gave her an opportunity to talk about her work with people who might know something about it. They have got to be careful because at the end what they want is a PhD. It's great to have two articles and a PhD but lousy to have two articles and no PhD. That's really hard yards.

Less individualistically more proactively I have been working with [name] he teaches at [university] campus sometimes. He said there is an awful lot of [university] PhDs who are feeling unattached to anybody, all of then in sociology of health and illness. Would you be prepared to come onboard as a conference down here. About 90 people responded to the emails to say we would love to. We will give almost all of those conference bursts who are

PhDs and that gives them a chance to present their work and we will put it out on a CD Rom at the end of it, it will be good. And I think initially things like that are very important.

Interviewer – and when is that happening?

[identifying information]

Interviewer – you said early in your career that you had said I will go for the big journal and they said perhaps not. As you have become more experienced at pitching your work, what's your hit rate, how often do you get rejected these days?

I got rejected a few months ago. I was devastated [laughs] Up [long pause] it is pretty high. You see the other thing you do as a youngster if I can put it like that is you have to bring things into existence. I will give you a biographical example. Is you have got to make the world work for you, because it ain't going to do it for you. And so when I went to Wellington, serendipitously on the Editorial Board, and this is a very important journal in my field, [name of journal]. On the editorial board was [name]. So I said to him are there "Any there gaps in [journal]?". What it does is provide an overview of the discipline. And he said we haven't had a sociology of health and illness since the mid 50's. And I said alright I will write to the editors and propose that and they wrote back and said yes. So you have got to be very proactive. And that then, because it was such a big coup meant that a lot more people in the system know about you and want your name in the journal, they want your name on the front cover.

Interviewer – And have you been approached very much, do you get approached to write papers?

Almost all my book chapters are the consequence of being approached. And vice versa, again you hear on the grapevine, that someone is putting out a volume on medicine in colonial societies, you get onto them and say I heard on the grapevine would you be interested in Australian/Canadian comparisons, as I work in that field. You know, you push yourself in. And second edition, they leave you out but that's alright you got into the first edition.

And also about not, if someone asks you, you always say yes you will do it. You never let somebody down in the publishing field, editor, commissioning editor, it doesn't matter because that goes around the traps too. You want a paper on X, ask Y because whether or

not they actually take it. The last one that was rejected – they asked for it but I wrote it in the teaching period and even though I knew it wasn't up to scratch. But they ask because you are a known quantity. (30.29)

Interviewer – OK this is somewhat of an abstract question so answer it however you wish. Why do you publish.

[whistles] God knows. To answer the perennial question of "Am I good enough?" What drives academics has got to do with profound and deep insecurity somewhere along the line because you wouldn't do this for the money and you wouldn't do it for the fun. It's the personal demon that drives you. Autobiographically I always wanted to be a fiction writer, that's what I always wanted to do and when I wasn't I thought I still want to be a writer and academia became it. Not all academics share that. Maybe only three out of 10 of us that are that driven.

Interviewer – and how much refereeing do you do?

Scads. Like I did two over the Xmas break for two international journals. I could look it up on the CV if you want it [looking online]. Manuscript referees 2006 – two, last year I did health sociology review, 2004 – three, 2003 – three, 2002 – five, 2001 – three, and then back 1998 – two, 1997 – two, 1996 – two. And that's for all sorts of journals, European, American, Canadian, Australian. It's also for major book publishers.

Interviewer – and these are articles you are talking about?

These are refereeing articles and full length book manuscripts. As well as book proposals. So it's a lot.

Interviewer – And what sort of time does this take you?

If it's a whole book takes three weeks of work outside the office lying on the couch reading it. With journal articles I'm pretty fast at it now, usually two days unless it is a very complex article or unless its an article that I think should be published but it needs a lot of work done to it and then it might take nearer to four to five days. So they are time consuming. And PhDs as well I have done over 35 PhDs in the last while.

Interviewer – and how do you feel about the time you spend refereeing?

It doesn't worry me. I look at academic life as pretty seamless. So the time put into reading someone else's manuscript is me learning and often ahead of the pack because you are reading something new. The process of reading articles is very instructive because if you reject one you need to give a good reason. And you take that on board for your own work. When you mark PhDs generally speaking you learn a hell of a lot. I have done 34 PhDs. So I don't think of them as falling into categories of my work and not my work it is just my work. You can't walk out of the office as an academic and turn your brain off, you can, you go home and drink two bottles of red wine, that's the only way you can do it. So I don't think of it as time I would otherwise spend as doing my work.

Interviewer - Have you ever been compensated for the time you have spent reviewing in any way?

Very little – publishers used to give you two books off their list. But they have stopped that I think they hit a tax problem or something. I certainly haven't had any free books from publishers in a long time. No you don't get compensation but on the other side you get professionally known or known about which may not pay off for 10 years. And you meet the author at a conference and you say blah blah we could work together. You don't get financial compensation.

Interviewer – what is your understanding of the copyright status of your work?

I scarcely have any idea, I wouldn't know. Most journals take over copyright but will release it back to you if it is for you to put somewhere else in your other work.

So when I wrote my books its got the guts of three papers in it somewhere. They are very happy for you to reuse your work in the context of helping it further with acknowledgement. In terms of book chapters – I have no idea. It is not something I ever think about.

Interviewer – so have you been in a situation where you have had to ask for use of your own work?

Yes in the text book on [topic] I had to get [publisher] in USA to release two articles back to me.

Interviewer – and was that a problem?

No. It would be a problem if wanted to use in, say an edited collection by someone else. And I'm not even sure why they keep control like that. But it's not a problem if you just want to reuse it under your own name in a different context. Quite frequently if you pick up an academic book in the acknowledgements it will have maybe eight or nine chapters, seven of which started off as articles.

Interviewer – and you are happy with that situation?

Yes, believe me, no money hangs on it, we are not talking Jeffrey Archer here. (38.12)

Interviewer – lets move onto the other side of it, which is you as a reader rather than an author. How do you keep up with what is going on in your discipline?

[Big breath out, under breath 'oh god'] By the seat of my pants. What I do and this is where the pay off in refereeing and examining theses comes. You pay very close attention to the bibliography, in fact one of the first things I will do when I am reading a manuscript is look at the bibliography. It says an awful lot about who they are, where they are coming from, what speed they are at and how up to date they are. That's a very useful way of staying across the field.

Interviewer – so if there is something you haven't seen you will look it up?

I will track it down, yes. And if a PhD student and they say I have read blah blah, I will say give me the reference and I will track down. So I will read alongside my PhDs a lot, both to keep up with them and to keep up with the literature but with the Internet it's a nightmare. Put in keywords in any topic you get 300,000 hits.

Interviewer – and what search engine are you talking about there?

I use Google.

Interviewer – so do you get sent tables of contents and articles and stuff?

Yes I do I am on Ingenta and I get about five or six, oh maybe more, seven or eight journals regularly. But I don't usually have time to read through them but it is a good way of keeping up with what is going on.

Interviewer- so when you say read through them do you mean the emails or the articles?

Yes the emails.

Interviewer – so the bulk of what you are looking at is things that come through on bibliographies and PhDs mentioning material. So that is something which is not coming to you, you have to go and find it. So what is the process you do when you know you need to get Smith article what do you do?

Go into ANU library, look up the journal in the electronic selection and download it.

Interviewer – and how often would you hit a barrier, when there isn't a subscription or something like that?

Not often enough to cause concern. Lets put it another way. I haven't put in an interlibrary loan in for an article for about five years. And so much now is archived. When I was writing this [topic] book, I wasn't very savvy and I used to go across to the school of medicine library and pull all the journals off the shelf.

Interviewer – when was this?

2002. Yes I came to the web very late. But that was great fun sitting in the school of medicine library. You find out so much more serendipitously that you don't come across on the web. You don't spot it because of however it is coded or how they have chosen to key words doesn't trigger anything. And when I was writing the dictionary the web was a positive nightmare because if you put in a key word you just got everything under the sun. So I spent a lot of time in the library physically pulling things off the shelf. How they had defined or used a word, what context it was in, had it changed over time.

Interviewer – so generally you are finding you have got the access you need to the things you need to look at. When you say you go to the library and download it, what do you do with it at that point?

I put it on my desk and read it.

Interviewer – you print them out?

Yes I print them out. For instance this one was a great find. I just printed it straight out. It comes to here [computer] and goes to there [printer].

Interviewer – do you keep an electronic copy?

No.

Interviewer – have you ever had to approach an author? In the few times you haven't been able to get hold of something you mentioned interlibrary loan, have you ever contacted the author direct. Has anyone ever contacted you for something?

Yes I have had a lot of requests for that, the overview journal, especially from the then Soviet Union and India. I don't think anyone from Europe, Australia and USA. You get not a lot but perhaps a dozen "Please send a free copy, I can't afford to buy or I can't get access to it"

Interviewer – and what did you do in that case, did you photocopy it and post it?

I can't remember, I don't think I did anything to tell you the truth. My memory is I didn't do anything. But it's a very rare event contemporarily speaking it wouldn't have happened in the last 10 years.

Interviewer – Ok. Now the last thing I want to talk to you about is something called open access top the literature. Is this something you have heard of or are aware of?

Is this [identifying information]?

Interviewer – that could be part of it.

Well to that extend I have heard of it. I worked with them last year. I am working with another academic on a series of five annual conferences around [topic]. Was the umbrella title. So Volume 1 was [topic] in multicultural societies. Volume 2 is negotiating the [topic]. Volume 3 which I'm just about to start is [topic] and Volume 4 which is this year's conference is [topic] in education and Volumes 5. is the role of the family. Because we wanted to talk to a bigger audience than just academic we didn't want to put it on a shelf. So we went to [identifying information] with the proposal we run these conferences as a

collection through them precisely because we wanted to hit people outside academia, people of different faith groups people of different minorities. And it worked. If you look at [identifying information] hit list, the biggest hit is a book on [topic] with I think 13,000 hits. And we have I think 6000 hits which is a very.

Interviewer – and it's freely available on the site?

Yes you can go on the site you can look at it you can download it as a pdf. You can print it off.

Interviewer – and you can order a copy?

Yes you can order this for $25. It takes them two weeks.

Interviewer – do you know how many books have been ordered?

Well that 6000 is downloads of the book. I don't know how many copies sold. [Identifying information] would tell you if you asked them. We did have a formal launch last year. I think they sold all they brought in a box that night. It's done quite well. So I'm all in favour of it if that's what open access boils down to then yeah because we have done a lot of good work in here, but no punter is ever going to pick these works up.

Interviewer – one side of open access, there is kind of tow main ways to open access, the green and gold roads to open access. You have to call these things something I suppose, So the gold road is in terms of journal articles, is an open access journal that works on a different business model rather than subscriptions. And so the printed, or often they are not printed, they are just online, the final published article is freely available. That's one way of going about it. The other way is for people to put pre or post prints into what is defined as an institutional repository. Which is sometimes disciplinary based or institutionally based. The most famous one which you may have heard of is called ArXiv, its been running for some time now in high energy physics. [Identifying information] So if you chose to you could put all of your work into open access format if you wanted to. I presume this is news to you?

Yes I have no idea what talking about [laughs]. Look I only got to the web five years ago it's going to take me a bit longer to get anywhere else.

Interviewer – yes they do need to do something about letting people know about this and how to go about it,

[Laughs]

Interviewer – but in principle the idea, given that you wouldn't be breaching copyright laws that there is already agreements in place with the publishers you have published with, assuming that's OK, would that be something you would be interested in or see any value in?

Who accesses it? I guess people who know it exists.

Interviewer – well when you type in your topic in Google it comes up.

Well I can't think of anything against it.

Interviewer – the whole point of it is that the metadata – the information behind the file that lets people find the file, so search engines like Google can find this stuff

Well I certainly makes sense. Certainly the earlier work in smaller journals. So *Explorations* ceased to exist years go. So you could take that material and pop it in there just to bring it back to life. That would make a lot of sense. I wouldn't know what copyright would be for big international journals. But I would imagine there would be a bit of a problem there.

Interviewer – OK that is pretty much all the things I wanted to talk to you about. I have finished my interviews at [university] and am now embarking on the [university] aspect of it. I am hoping to do a presentation at the [university] to talk to them about their repository, and I am probably going to do something similar here. I happy to go away and never talk to you again, but I'm also happy to let you know if I do something that is accessible.

No do, I'd be very interested to keep up with what you get up to. Have you found anything interesting yet?

Interviewer – I have actually. One thing I have found, and I sort of did know this, but it has been very much [end of tape]

Appendix 4f - Full transcript of interview: Computer Science at university B

(1 March 2007)

Interviewer – What I'm looking at is the way different people look at, interact with the literature and what I mean by that is as a reader and as an author of the literature. I am comparing different disciplines so Computer Science versus Sociology versus Chemistry and looking at the ANU and at UNSW and seeing if there is any institutional differences as well.

Yep

Interviewer - So I am asking everyone the same set of questions, and that's basically what we are doing. So in general what I tend to ask people in the beginning is to talk about the kind of work that you do in terms of how much of your personal time is taken up with research versus teaching versus administration, also the work that you are doing in terms of your research is that all sitting in front of your screen or do you interact with other people or do you put chemicals together and laugh maniacally and stuff.

(laughs) Yes

Interviewer – So if you could give me that sort of background

Yep, so I. At the moment I am on an ARC fellowship I just started on the fellowship, so I am 100% research. I still of course have some admin tasks and of course, PhD supervision and a little bit of voluntary teaching. But notionally 100% research.

Interviewer – And what kind of research is that?

In the spectrum of computer science research, the work I do is loosely called systems which means we are at the engineering end of Computer Science which means building artefacts, designing better artefacts and so forth rather than the theoretical end of computer science. There are lots of different fields within computer science but ours is characterised by the fact that it is more at engineering level designing better permutations of things.

Interviewer – And do you work collaboratively?

Yeah very much so. (2.06) All of my collaborators aside from my two students, I have two PhD students. Aside from them all my collaborators are in the US. I have one in the UK. Occasionally I work with people in other countries as well. Mostly, almost exclusively my collaborators are in the US. I am part of a research consortium which I helped to get off the ground. That is a focus in terms of collaboration. Until recently we has six monthly meetings there were six institutions involved I think.

Interviewer – and that's real – you were all actually sitting in a room together?

Yep, yeah, Six monthly we would get together and sit in a room together for three days and we've published a huge amount of stuff together. I think together the consortium published about 150 papers and graduated 30 PhD students.

Interviewer – 150 papers?

Not to me, but our group. Something to that order. It's a lot of papers anyway. A large number of papers and graduated a considerable number of PhD students, over a six to seven year period.

It's a very focused group. A lot of those papers will have more than one institution on the paper which means a lot of collaboration going on.

Interviewer – And how do you communicate when you are not in your meetings?

So I meet very regularly via video and have been doing that regularly ever since I returned from the US which was five years ago now. I had a meeting which finished a few minutes ago. So video is my primary …

Interviewer – and this is through your computer screen?

Yes I just use the iChat which is a standard Apple tool.

Interviewer – so you are not Skyping or anything, its just …

well, if I am talking to non Mac users I would use Skype, but iChat and Skype are much the same thing. Oh and I do use voice over IP as well for phone but its mostly video. I prefer

video I have a very strong preference for video in terms of the effectiveness of the communication.

Interviewer – So how often would you have a video chat to somebody?

It depends on whether we are coming up to a deadline crunch or not but up to five days a week.

Interviewer – Oh OK

But with one. I mean my main collaborator is in Texas and I meet with her it varies between two and five times a week

Interviewer – And it obviously has to be the morning at this time of year.

Yeah, so I meet at 9am in summer and 7am in winter.

Interviewer – Yes I have a very good friend overseas and it is the same.

[laughs] yeah

Interviewer – So do you use email much?

Yes I use email heaps. Email, for any given collaborator when I'm working heavily with them I might have five emails per day with a person, I'm just guessing. But the quality of communication during one hour video is, email is just picking up the bits and pieces. Typically we would just summarise the meeting in an email. If there is a student involved the student is required to do that an email summary as a discipline.

Interviewer – so they would come and sit with you and be part of the meeting?

Typically it's the other way around, [identifying information]. That's one of the reasons I like video because it's very hard to get cues from someone I don't know very well just over the phone.

Interviewer – so you meet with them over the computer and they will summarise what you have discussed.

Them and their main supervisor who is one of my main collaborators. So I am on three student's thesis committees. One other important tool and it depends on who the student is but we use Wikis quite a lot.

Interviewer – yes I am hearing this, so how do you use wikis?

I use it in a few different ways. But with a student the best thing to do for a student discipline is we will have a wiki set up for a project. Usually projects are focused on a particular publication, so "we do this work and try to publish it here" So the student will track progress on the wiki. So they will publish each day after each meeting they will publish research notes on the wiki, summarising the meeting. And before each meeting, preferably the day before each meeting, they will have new results there, links to web page of results and graphs, data and so forth. During the meeting we will often be very much focused on the wiki, looking at the results the students have produced.

Interviewer - And you can split your screen and allow you to do that?

Oh yes, so I will have the video there and wiki there.

Interviewer – And with your wiki is that potentially openly accessible? If someone knew what the url was?

So this particular wiki I use with my collaborator in [place] that my students use. That one is password protected so it is just for research group. That's pretty important. The reason why it is password protected is because it is has got a lot of ideas that are not ready yet they are not mature to be made public.

Interviewer – so obviously you get to a point where things are getting closer to where you want to be in terms of putting something together for publication and do you continue with the wiki or do you..

Yea yeah

Interviewer – so does the drafting of the paper.

Yeah the drafting of the paper. Depending on the student particularly an overseas student the writing may fall to the senior, myself and collaborators. Student may be producing final results and graphs and what not right up until close to the deadline so we will be using the wiki until pretty close to the end. (8.34)

Interviewer – But you are not composing the paper?

No, what we do we have a whole methodology around that which we have developed over the years. What we do is we have, I don't know if you are familiar with the term, version control system and that will be located somewhere we can all access and we check the paper out and check it in. And every time you change something and email goes out to all the people associated with that particular paper. Sending them a summary of what was done, and before you start you always check the thing in and we typically will break the paper up into logical chunks. So any one person can work on it without conflicting with another author.

Interviewer – and when you say this is something you have developed over the years, who do you incorporate into that.

Mainly me and my collaborator in [place]. Basically I follow this approach. When I say developed, I mean it's a work habit. It's not a tool or anything. So we are just using existing tools but we are doing it we are following a particular discipline. Basically with everyone I collaborate with, my colleague in [place] and I push this pretty hard because we do it so much, long distance collaboration. Oh and the other thing that is important and why this is so sort of neat in a way is because we are often 12 hours out on time zones, so while one is sleeping the other one is working on the papers so we are doing pretty much tag team writing on the papers. So finding a good way of doing that is really important.

Interviewer – And the version control system is that just open source software?

Yeah, it's called "Subversion" the one that we use but there are lots and lots around that's just the one that is most popular that is open source.

Interviewer – And then your um, but within that you can use different program to actually write?

Yes

Interviewer – that just sits on top of what you are doing

Yes its like a disk, it's a logical fancy disk that allows you to go back in time and labels things and say I've saved this now and all that history is there and you can wind back the clock.

Interviewer – so it sits on top of your metadata and looks at what's going on or does it go into the document.

No the document sits on it, that's why its more like a disk. So the document could be Word – we don't use word but it could be there is no reason why it wouldn't be, and often its not just word it is graphs, could be pdf or the outputs, it could be excel spreadsheets. Anything, basically any text or data associated with the project is put into the system and it really looks like a file system, a disk except it has this version control that allows you to go backwards and forwards in time so we can recover things if things go astray and data is obviously one central thing we are all accessing via the network, so it means we are sharing that's the obvious important thing.

Interviewer – well to continue on with the whole writing thing we are on at the moment. Um, when you are making your decisions about writing a paper, how does it work for you guys. Some people go, oh this is a great idea, write it up and say where shall I send it, other people are quite determined before hand something before they do the research about where they want to send something. Where do you fit in on that scale? (12.00)

All over the place, depending on the work. Typically we will have a thread of work going for some students and one student will carry on one track of work, so a student will have some neat idea, and we will say lets develop this and see where its going. As the idea develops we will be thinking about where we can send it and that can happen sooner or later. At one end of the spectrum we can say we really want to have a paper at such and such a venue which is due in 12 months from now, or 11 months from now and you are thinking about what you are going to put in there. That's one way of looking at it. We do do that, on the other hand, we think here's this neat idea where are we going to send it? But both, you need to identify where you are going to send it early on, at least, and I'm relatively conservative but I'd say at least 3 months in advance is when you need to know exactly where you are sending it because you then target the research and how you tell the story according to the nature of that venue, both in terms of expectation of quality, you

know if it is a low grade venue than you don't need to do absolutely exhaustive work the expectations are lower and also in terms of the audience. So for us, and this is probably typical, the higher the impact of venue the more general it is as a rule. The more specific ones are lower impact. And so if you shoot higher it also means you have got to cast your work in more general terms. Like going to *Nature*, we don't, computer sciences don't publish in *Nature* but that is the extreme in terms of generality. So that changes the way you are going to tell your story. That changes the way you are going to do your work slightly. So I always like to have a very clear picture in my head of where the paper is going, early, but for us early is three months.

Interviewer – and does the issue of how you have to present your material in terms of specifications is that an issue for you?

What do you mean?

Interviewer – well you know, it has got to be in a certain font and you can only have a certain number of words, spaces and all that sort of stuff.

Oh yeah, in our field it is all is very uniform. It just so happens to be very uniform, it is almost always 10 pages of nine point or eight point. We have style templates and it is basically the same for almost everything we shoot for so we hardly ever think of that. Although there is one conference which is virtually unlimited in length. So if we do decide to go for that one we can remember that we don't have to worry too much about space for that one. But with respect to everything else the format almost identical so if you look on my papers on the door there you will see they all look almost the same. Even though they are at different places.

Interviewer – OK, alright, and do you tend to get your pitch right, like how often do you get rejected, like how good an estimate are you of your work? (15.03)

Um, I think we do pretty well but I won't give myself credit for that, my colleague's very canny at doing that. That's experience, she's very senior, my primary colleague in Texas is very senior person with a huge amount of experience. And that's the other thing, experience is very important and that was the thing I really lacked when I was a PhD student here is my advisor wasn't in the game if you like. During my post-doc I got in the game as it were and, sorry this is a bit long winded but it is sort of important, and the way our things work is the primary publication venue for us is conferences, and they are

refereed, each paper is refereed by, depending on the conference three to seven reviewers. So there is a program committee for the conference and their job they are basically and editorial committee. Now you get, there is a procedure forming these committees they have to be diverse, blah blah blah there is a set of rules, but if you get invited onto one of these committees you get an insight into the whole process and you get a sense for the way people are making the decisions to include or exclude papers. And after my post-doc or during my post doc I started getting invited onto those and I'm now actually on a lot of those committees and that gives me an insight into how a lot of those decisions, so it makes it a lot easier to get my pitch right. So I think that is really crucial, the thing I totally lacked in the first five years of my career and I was totally shooting, stabbing in the dark.

Interviewer – and what years were they that you started?

[identifying information]

Interviewer – so it wasn't until 1997-1998 that you kind of..

1999 when I started doing my post doc in the US

Interviewer – that's when you really

That's when I learned and started to play the game. It wasn't until 1999 and it's pretty obvious from my publication record that my first publication was in 2000 my first serious publications and at all picks up after that. Because it takes a while once you move into the thing before you get your first publication out the door. So my first serious publication was in 2000. So I don't think while I was in Australia, before I went to the US for my post doc I don't think I published any papers in what I would now regard as the top venues. And that was basically through lack of experience.

Interviewer – one of my questions which you have kind of just answered (17.34) but add anything you think relevant is did you receive any formal or informal instruction on the publication process during being a student

No

Interviewer – So that just didn't happen at all?

No, no not really, I , No. I had a very happy PhD but my PhD was very hands off

Interviewer – Your supervisor?

The whole PhD experience was a hands off experience, but yeah my supervisor was very hands off, he was very good, um, but, um, I drove the publication thing during my PhD and I submitted it might have been as many as 10 papers during my PhD of which about three or four were accepted.

Interviewer – And why were you doing that?

I used it, I finished my PhD very quickly, used the submission of papers to focus m work and give me deadlines. That was very successful in the end. I did the PhD in three years and got some nice results but the hit rate was very low, three or four in ten, but even the dead papers, the papers that went nowhere become fodder for the PhD.

Interviewer – And that's not something that other people have described as they have done, so what was the impetus for you was it just you know you needed deadlines or was it

[Name] was 10 months ahead in [his/her] PhD pipeline,

Interviewer – that's your partner?

Yeah so I had the, there were other people here who weren't getting through. So I formed that idea that given in our field conferences... Let me just rethink my thoughts. The key thing is in our field is conferences are the major venue and conferences have hard deadlines. Because they have hard deadlines you can, it can cause you to focus your work towards the deadline and for me that makes me more productive. I don't work very well without a deadline in front of me. So I basically use it as a tool, a psychological trick to get me to do work. (19.54)

Interviewer – OK so the other side of that question is now that you have got students below you do you give them any formal or informal instruction about the publication process?

Yeah, I'm trying to. Um, there are a few things I have done I have found some good books during my experience. One of them was a very well known one - Phillips and Pugh "How to get a PhD". That's obviously non-specific to our field but I found that to be enormously

helpful, but I only discovered that at the end of my PhD. I encourage my students to read it before they start or right at the beginning. The broad idea of trying to get papers, a string of papers done during the first 2/3 of the PhD as the foundation of the write up stage I have found I encourage my students to do, with mixed success. With reasonable success, not enormous success.

Interviewer – and in terms of the actual writing up process, so you encourage then and you do have students keen to do this so how does that, OK I'm going to use this particular chunk of results and start writing it up and do you work through it with them or…how do you do it?

You mean for the PhD, for the thesis?

Interviewer – No for publications.

That's complicated and it varies from student to student. Like I mentioned earlier, with particular students and I had this collaborator whose English was a fourth language, and the most recent paper I wrote just a few weeks ago my collaborator was Russian. In both cases I ended up doing all most all of the writing. And that sometimes happens with students, particularly if they are overseas students. So the other person, the student or the collaborator, their role basically becomes delivering the result and analysing the results and reviewing the papers. But depending on the student and what their skills are like there is a spectrum between them writing the whole thing themselves and me writing the whole thing. My preference is for them to do as much writing as possible because that is one of the skills we are trying to impart but in practice particularly if they have poor English skills and particularly at the beginning, often it's me doing the writing. That's not just for the students though, I should say when I work with my collaborator in [place], because I'm the one doing the instrumentation work its often her that is doing the bulk of the writing. Just because right up to the crunch I am still generating results or finalising results, it's not just the students who see it that way.

Interviewer – Now this is a fairly broad question, so answer it however you want, why do you publish?

I think I have two reasons, one is that I get a lot of satisfaction out of seeing work being exposed and accepted and taken up. Taking up of work is great and research publication is one of the primary ways we do that in our field. The other primary way is through software artefacts and I have been doing a huge amount of that as well. It is completely

different but a very time consuming thing, we have a lot of open source software that we publish, that has the same thing of sharing what you have done, a sense of satisfaction there. In terms of writing papers, another point there is it offers a sense of closure on the work. And that may go back to help answer some of the story I was trying to tell about trying to finish my PhD is that an individual research paper very discreet with a definite ending to it. One of the biggest problems people have with a PhD is getting closure on the PhD. So if your PhD is a sum of a few things each of which has closure then it may make it easier to get closure on the whole and I like closure so…

Interviewer – So how much of your impetus to publish relates to the whole career thing?

Compared to my peers I'd say not much, compared to my American peers I should say, its an important qualifier. Compared to people here I would say a fair amount.

Interviewer – So do you think you have got a, I am just trying to work that through, so do you think from your experiences in America it has opened your eyes more to what is going on how the system works?

Yes so, in the US because of the way the tenure process works particularly, there is enormous pressure to publish and publish at quality venues. There is a much stronger sense of quality venues are and where impact lies and people are much more driven towards getting those publications out the door. It is very intense, much more so than here. So people play the game very thoughtfully.

Interviewer - So in the same way when you got to the US you discovered the whole get on a committee, work out how a system works, and get on and do it, but you also worked out that there is this other process that sits on top of publications that affects you

Yeah

Interviewer – and that is not something you got from Australia.

No not really, no. Because, not really and I think this partly reflects this particular department, where there is not a strong publication culture. That is changing right now as we speak, I forget the term, but I have been, I've only just recently rejoined the [university] so I'm being a bit vague here about the details. There is a review coming where the

department has got to demonstrate its research output that's new. Previously the focus on publications has been very weak.

Interviewer – And how do you know about this review

Just because someone in the department has asked me to tell them what papers I have published so they can go into it with..

Interviewer – So it is not like you have had a sort of meeting where they have said this is what its about.

That may have happened it may have happened before I was back in the department it may well I am sure it has been discussed at staff meetings but I haven't heard either way or before I came back to [university].

Interviewer – the only other thing about publication is on average what is your sort of timeframe between submission and acceptance? (27.00)

I've just been having a huge email debate about this on a conference I am on the program committee for, and this particular conference I can tell you exactly what the timeline is. We, people submit one week, four days later the papers go to the reviewers. The reviewers have in this case only three weeks to turn the papers around. The authors have one week to respond to reviews. Then the committee meets and decides on the spot, it's a one day or two day meeting. And so we can ad that up , its 4.5 or five weeks something like that. That's at the tight end of the spectrum. The others might be a month or more generous than that so the result is the reviewers have the papers in their hands between one and two months.

Interviewer - that is between submission and acceptance, what about the broader one between submission and publication.

That is changing a lot at the moment as publication the technology I think is making the change but that is changing. So typically our major conferences, one is submission in March, publish in Oct. The other major one is submission in November for publication in June. They are our two big ones, but a lot of lower grade conferences like the one I was discussing in more detail, they have faster turnaround For example what we were having the big debate on the email about was do we want to pick up rejects from other

conferences, people who don't get into the other conference may want to submit things for this conference, but those two conferences publish at the same time. One has a deadline of March for October, another one has a deadline of May for October, they are going to be at the same place at the same time.

Interviewer – yes it is interesting how these things work. Now speaking of refereeing, lets move onto that, how much refereeing do you do? (29.12)

I do a little bit of journal reviewing. In terms of conferences, I am on two program committees a year, a program committee will require me to review about 20 papers as few as 15 and as high as 25 probably and each paper takes me three solid work hours. Really intense, no breaks.

Interviewer – So 60 times 20 – 40 hour week that's four weeks work is it?

Yeah well probably, but what I do is I have own way of doing this. I basically lock myself away for a full week and try and get one conference knocked over. So I try and review 20 papers in a week so that's working long hours with no breaks – because your effectiveness goes up enormously when you are not interrupted and not changing tasks, at least that's my experience, so that's… two complete weeks to reviewing and then there's all the other shenanigans that goes on, you have got to write the reviews up, part of that happens then. You have got to go to the program committee meeting which for me takes longer because you have got two days of travel to get to the US and back. I'd say easily three to four weeks now you have ask me to budget it, it costs me four weeks a year in that sort of work.

Interviewer – And how do you feel about that time?

I, you have to be very careful. Some of your colleagues they bite off more than they can chew and get into trouble. At the moment I have got the luxury of being on a fellowship so I'm under less acute time pressure. But I find it enormously rewarding to do that reviewing. [Phone call] 31.35

There is also a lot of status associated with being on a program committee too. That's important. Networking and all the rest of it helps your research career.

Interviewer – Just one last question on the issue of publications – What's your understanding of the copyright status of your work?

Um, I'm hopeless on this front. But my professional organization, the ACM (the Association for Computing Machinery) has, this is my understanding of it is they are very good on this front and they allow us to make our work available on our web page with an appropriate disclaimer and I have that disclaimer on my web page in fine print at the top. I forget exactly what the words are but it's a paragraph or two of legal disclaimer, then I can make my work available immediately and that's what all my colleagues do. So we make our work immediately available.

Interviewer – That leads straight into the idea of getting hold of material. How do you keep up with what's happening in your discipline?

One thing is the program committees. That's great because you also see the stuff that doesn't get published, you get a sense of what is brewing, what's going to be out there. So that's one of the reasons why you can justify spending so much time on that. The other one is networking at, some of it happens at program committee meetings and at conferences because conferences are such a vital part of our publication regime. So we go to the conference and you spend a lot of time talking to peers.

And for me that research consortium I spoke about is incredibly important. Because our consortium dominates our subfield in computer science, so if there is something good going on in our field, very often one of my immediate colleagues are there so I get to find out fairly early on and that's really helpful.

Interviewer – so they just let you know?

Well that's one of the rules. We set this whole thing up and we have these meetings every six months and there is an enormous amount of trust between us because its an academic family tree, everyone had ultimately the same supervisor, so everyone knew each other well, although distributed now. And there is a trust there that we won't scoop each other. And we invite people from industry to come along which exposes people to our work and we get contacts in industry and they are told very clearly that basically what we are saying is confidential. And vice versa so what they say, they can tell us stuff that is leading edge too. That is very effective. You get the heads up on what's happening.

Interviewer – Would you say, is this a fair assessment, is your interpretation of 'keeping up with your field' involves communicating with people verbally pretty much

Yeah

Interviewer – Verbally even in terms of email but its not following the literature?

Well of course you have to follow the literature. I guess one of the things is our field is so fast moving that you want to know before its published. You want to know what is brewing. Obviously it goes without saying that you have got to read the literature and you go to the conferences and read the journals and you know what is being published. For sure, absolutely for sure but to know what new developments are emerging and strategically that's what you want to know, how to get ahead, what has already happened. You don't want to know after the horse has bolted. (36.00)

So you will get a sense of where things are going this way then once you start doing your work you do literature reviews and of course you do that the orthodox way with search engines and stuff. But you search through the literature and find out what everybody else has already done. So you still have to do the literature reviews but this stuff I'm talking about just gives a heads up to where we are already going. (36.15)

Interviewer – OK Good. So lets move onto that, the digging around, how do you go about that?

I tend to just use Google but it is linked to our professional organization which has linked back all of our work for 20 years so it is all available digitally so I can just do a search and it comes up with papers and citations and I can download the pdf straight away.

Interviewer - so you are in the situation where you are, you know that John Smith wrote a paper on this topic in about 1983 and you are doing a Google based on that?

Well if it is something with a name like Smith which is going to make it harder to find via Google, I would just go to the ACM digital library which is linked to Google, Google will always find something if it is on the digital library, but if its Smith Google might find a whole lot of other junk as well. So I would go to our digital library and say Smith and then presumably I would know a word or two about what that is about, put that in there and it will find it for me and I do that a lot One other important thing is they have all their stuff cross linked so with their citations you can just click on them and follow through so if you are doing it transiently, you can just follow references, read this paper see what it refers to

you can just do that by clicking through, that's really important, you are less likely to be doing this type of searches for someone's name, you are more likely to be clicking a link.

Interviewer – So would you have used the [university] library, would you go in that way?.

Virtually never, virtually never. I've probably used it three to four times in 15 years.

Interviewer – OK so you are talking about a situation where you know what you are looking for, what is you don't? Are you ever in a situation where you wonder what has been done in blady blah and you just want to do a topic search?

Yes we can do that online too. One way I would approach that is if I am interested in what is going on in a certain area that's outside of my area, then I would typically browse the proceedings of the recent top conference in that area. So I find out the topic of the conference and I browse, and I do that all online, read abstracts of a few papers then read the whole paper if I feel it is going to be relevant. But often that can happen through Googling or just searching, you will find you get of some idea and you will keep searching. Once you have traction in the field it becomes easier.

Interviewer – Sometimes people would refer to that as serendipitous research, that's kind of what you are referring to isn't it where you are not looking for something in particular, and that takes you off here..

Yes that's the question you were posing, is if you are not looking for something specific then how do you do it, the way I'd do it would be the way I just said if you were just wondering what was going on in some other area that's pretty much how I would approach it.

Interviewer OK so you are then, you are still using the same search engines to do that?

Yeah but also our proceedings are online. As well as being searchable you can just look at the table of contents and search that way as well.

Interviewer – Are they freely available or are they available because you are a member of a society?

Both. The thing you have to pay for generally is a download of the whole text. All you have to pay for now is the pdf of the full text. The proceedings and citation have been

meticulously maintained by someone in Germany for ten years now and that guy is supported by our major organizations. And so you can go and you can find the table of contents for any particular thing and then he has links to all of the relevant digital libraries so you can follow through and dig out the paper.

Interviewer – What happens if he gets hit by a bus?

Oh, it has become more than a he now. It started off with one guy and it started as just 1 subfield of computer science and now it is all of computer science. It is linked onto CDs now too.

Interviewer – when you are talking about having to pay for the download of the whole text, what sort of cost is that.

It is membership to the professional body, it's a little hard to pin down.

Interviewer – so if you are a member you don't have to pay for this.

Yes there are different, its very complicated, there are all different classes of membership. You get these CDs in the mail. I think you can just get membership to the digital library and I think it is US~$90 per year for an academic and substantially less for students. In our area they massively subsidise students so the students almost get stuff for free.

Interviewer – OK, if you get to a point where you have got the proceedings and you needed to pay for them, wouldn't you just go to their website and get their version of it?

I'm not sure what you mean?

Interviewer – do you ever get to a point where there is a barrier, either you have to pay for it or its not freely available?

Oh absolutely I'll just search for it using Google and if the person has it on their webpage it will just show up. There's another thing called CiteSeer, that hasn't been maintained very well so I don't use that as much now but I always used to use CiteSeer and that used to gather downloadable versions of papers together so if it was downloadable anywhere it would be on CiteSeer. So I use CiteSeer but Google Scholar now does a lot of what CiteSeer used to do.

Interviewer – So how often would you hit a barrier where you would say oh OK.

Not very often. I can only think of one case where a student wanted a particular paper from an obscure workshop. They ended up asking the [university] library if they had it and before he knew it he had a package on his desk The [university] had ordered the book in, it cost US$200 or something expensive for this little book of proceedings. The [university] library got it, he has had it sitting on his desk. But it turned out while he was doing that, I didn't know he was doing that, I knew the program chair of the conference and managed to dig out the stuff that way. So by the time we had the book, we had the electronic copy anyway.

Interviewer – how often would you do something like that?

Go to the library? That's the first time it ever happened [laughed]

Interviewer – No, no, what you were doing, for example I have a friend at [university] and that library subscribes to stuff we don't here so I contact her and ask her to get me copies, and we trade.

No I have never done that, what I was talking about was the person I knew so happened to be the editor of that particular thing, I knew reasonably well.

Interviewer – is that the only time you have done that?

Yes I think it was and the only reason why was because it was an obscure publication for an obscure workshop which they chose to publish in a strange place. Most stuff gets published in a ACM, which I always have access to.

Interviewer – the last bit I want to talk about is the concept of open access publishing. Is that a term you have heard of? (45.00)

I don't think I have heard that specific term but I think I may..

Interviewer – OK what do you think it might mean?

So, I'll give you a little anecdote, about 10 years I went to the major conference of databases and they had a huge panel discussion – these are the top people in databases,

and the main person who was advocating it was Jim Gray. He was arguing that his professional association should make all the documents available historically and in the future for free on the basis of academic liberty and particularly on the basis of availability for underprivileged people and so forth. And he made a passionate argument. And they did. It has happened, this was the ACM Sygmod (Sigmod?) for databases and it has subsequently happened with other groups too, but they were the first to do it.

Interviewer – that is what it is

That was when I was a PhD student, 1993/4

Interviewer – There is pretty much two ways to go about open access, there is the green road and the gold road, the gold road journals, or an open access publishing outlet, and the ACM pretty much does that now, so if you are publishing with an ACM outlet, whether you know it or not you are publishing in an open access format. The other way is to put copies of your material somewhere freely available on the web. Now a lot of computer science people do that already on their own websites abut what universities are now starting to do and institutions worldwide are starting to do is build things called institutional repositories. Is that something you have heard of?

I haven't heard that term but a lot of my PhD students honours theses are on [university ADT].

Interviewer – Yes that's the [university] one

But I don't know, I have no idea. I would never have considered putting my published work there, work that is published in other venues, I would never have considered that because it's so easily accessible already. And I would have no idea what the legal issues are associated with that, so I just wouldn't have entertained that idea. I am not opposed to it at all but that's why I wouldn't have considered it, because of the fact that it is already visible.

Interviewer – Alright so for you to consider doing that the sorts of things somebody would have to discuss with you would be why you would bother for a start when you already have material available, but also that this is the legal arrangement, that's about it?

Yes, for the honours theses it's a no-brainer because honours don't get published by the ACM so that makes total sense, but for a paper that is published in the ACM, I don't see, I

have no idea what they think of me doing that. And it's pretty much freely available so the benefit associated with that is really marginal – its unclear that's what I mean.

Interviewer – yea, there is talk of tying the repository into the RQF. In the same way not having to report to the research office.

Well that would appeal to me. The ad hoc reporting of research publications is an admin drag. If there was some standard way of doing it, you know I have to go and update my webpage with my publications, if I could just do it that once somehow and it was automatically known and made available to everyone that would be great. There is one issue that I would want them to consider, and that is that, if there is a tradition in our field of making stuff publicly available then people expect stuff to be on our webpage or on the ACM, they are not going to go looking for the [university] place.

Interviewer – Yes the University of Melbourne, the way they have done it there is they have tied their administrative human resources and reporting all together in one system so your CV comes up. The idea is put it in once and its up.

Sounds great!

Interviewer – And I think that the argument for having things sitting in your repository perhaps with a link from your page, is that the repositories are now looking at long term sustainability. So words like that would be amenable to you?

Yes that all sounds great. The little sketch you gave me about what's happening in Melbourne sounds great to me

Interviewer – yes personally I think that's the best way of going about it. OK thank you that's all the stuff I needed to talk to you about. Pretty much what I'm doing is… [end of tape]

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[xi] Website: http://scholar.google.com/intl/en/scholar/publishers.html accessed 5 October 2008

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[xxx] Website: http://www.anu.edu.au/graduate/scu/ accessed 29 September 2008

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