

Reassembling scholarly publishing: open access, institutional repositories and the process of change

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REASSEMBLING SCHOLARLY PUBLISHING: OPEN ACCESS, INSTITUTIONAL REPOSITORIES AND THE PROCESS OF CHANGE

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Thesis submitted in fulfilment of the requirements for the award of the
degree of Doctor of Philosophy

2008

Information Systems Technology and Management
Australian School of Business
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ABSTRACT

Open access (OA) to scholarly publishing is encouraged and enabled by new technologies such as the Internet, the World Wide Web, their standards and protocols, and search engines. Institutional repositories (IR) as the most recent technological incarnations of OA enable researchers and their institutions to make accessible the outputs of research. While many OA repositories are being implemented, researchers are surprisingly slow in adopting them. While activists promote OA as emanating from the ideals of scholarship, others revile OA as undermining of scholarly publishing's economic base and therefore undermining quality control and peer review. Change is occurring but there are contested views and actions. This research seeks to increase understanding of the issues by addressing the research questions: "How and why is open access reassembling scholarly publishing?" and "What role does introducing an open access institutional repository to researchers play in this reassembly?"

This thesis contributes to answering these questions by investigating two IR implementations and the research communities they serve. The research was conducted as an Actor-Network Theory (ANT) field study, where the actors were followed and their relations and controversies explored in action as their landscape was being contested. The research found that central to our understanding of the reassembling of scholarly publishing is the agency emerging from the sociomaterial relations of the OA vision, IR technology and researchers. Being congruent with the aims of scholarship, and also being flexible and mutable, the OA vision enrolls researchers to enact it through OA IR, thus transforming scholarly communications. This is counteracted by publishers aligned with the academic reward network within traditional publishing networks. In this delicate choreography the OA IR, its developers, researchers, university administrators and policy makers are merging as critical actors with their more or less congruent vision of OA enacted in their network. The comparative ANT account of the two IR life stories shows how such enactment depends on the degree to which different OA visions could converge, enrol and mobilise other actors, in particular institutional actors, such as a mandate, in transforming researchers' publishing behaviour.

This thesis contributes to a novel and in-depth understanding of OA and IR and their roles in reassembling scholarly publishing. It also contributes to the use of ANT in information systems research by advancing a sociomaterial ontology which recognises the intertwining of human and material agency.

DEDICATION

This thesis is dedicated to my beloved family: Especially my husband Neil and sons Sam and Michael, who generously and kindly supported me in every way, who enrich my life immeasurably and who gifted me the time; my father David who would have, with twinkling eyes, said “about time!”; and my mother Beverley who wisely counsels that everything has its own time.

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Kennan, M.A. and Kautz, K. (2007) "Scholarly publishing and OA: Searching for understanding of an emerging IS phenomenon". *ECIS 2007 - The 15th European Conference on Information Systems*, University of St.Gallen, Switzerland, 7-9 June 2007

Doctoral Consortium

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CHAPTER 1

By the dawn of the twenty-first century, the tidy but modest library that looks out on the gardens at the Kenya Medical Research Institute (KEMRI) in Nairobi was able to subscribe to only five medical journals. ...it had been forced to cut one journal after another from its list of subscriptions, as prices kept jumping ahead of budget allocation and the Kenyan currency fluctuated (Willinsky, 2006).

An old tradition and a new technology have converged to make possible an unprecedented public good. The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the internet. The public good they make possible is the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds (Budapest Open Access Initiative, 2002).

1 INTRODUCTION

This thesis is an exploration of open access (OA) and institutional repositories (IR) and their role in transforming scholarly communication. The research was conducted in the manner of an Actor-Network Theory (ANT) informed field study, which I have termed an ANT field study. This chapter introduces the thesis. It sets the scene by providing a background to this research. It provides definitions and scopes the field of study. It then introduces the research motivation and objectives and finally provides a guide to the rest of the thesis.

1.1 BACKGROUND

Scholarly peer-reviewed articles and conference papers are crucial in the work of academics, scholars and other researchers. To begin research in most fields, the previous relevant scholarly and scientific literature of that and related fields are generally consulted. This previous research is most commonly published in journals and conference proceedings, where the research papers are refereed or peer reviewed by qualified experts prior to publication for quality control (Harnad, 2003). This research process has been described as a “worldwide, collaborative, cumulative and self-corrective cycle of publishing, accessing, and using research findings in order to generate further findings, applications and publications” (Bosc & Harnad, 2005).

Technology has always played a role in scholarly publishing. It was the invention of the printing press and movable type in 15th century that enabled the emergence of the scholarly journal (Eisenstein, 1979; Bohlin, 2004). Since then the development of printing technology and scholarly publishing can be seen as mutually interdependent, each influencing the other (Dewar, 2000). This relationship however has been disrupted by the use of new Information Technologies (IT) and in particular the Internet (Kennan & Cole, 2008). By harnessing the technological capabilities of the Internet and the World Wide Web (WWW) researchers, research institutions and scholarly publishers are all changing their practices and thereby transforming scholarly publishing. In fact scholarly publishing could be characterized as a world wide, complex, distributed information system. Researchers are uploading their papers on personal Websites, thus making them widely accessible. Universities are building institutional repositories to capture and present their research outputs. Many researchers are providing their papers on disciplinary repositories and this has become the norm in some disciplines. These trends towards OA scholarly communication have threatened the role and interests of traditional scholarly publishers. In response many traditional publishers have themselves adopted the Internet and the new Web-based technologies to make their journals and articles available over the Internet, utilising what is commonly known as electronic publishing. In doing so they have preserved the old subscription based business models. The costs for academic and other institutions accessing these journals are steadily rising.

Journal publishing is big business. Outsell, a market intelligence service, reported by Van Orsdel & Born (2008) claim that the top ten publishers pull in 53% of a revenue of \$16.1 billion for the market, but in the past few years growth for these players has been relatively low at 0.5% to 7.6%. None-the-less prices for subscribers, mainly institutions and libraries, are tipped to rise between nine and ten percent in 2008, slightly higher for the humanities with an estimate of 11%. The number of journals available and their costs have been steadily rising and it is increasingly impossible for any institution to provide access to all, or even most of them (King & Alvarado-Albertorio, 2008).

Thus, the rapid growth of the Internet and the advances of Web-based technologies seem to have spawned two contradicting developments in scholarly publishing: one towards enabling and promoting OA and the other towards restricting it and preserving the barriers to scholarly works. My work on this thesis has been motivated by the possibility of examining these contradictory developments and changes in scholarly communications practices by researchers and universities.

Increasingly individual researchers are making their work OA. For the purposes of this research, a widely accepted definition of OA (Budapest Open Access Initiative, 2002; Drott, 2006) is adopted and refers to work that is freely available via the Internet without financial cost or legal or technical barriers. Users can “read, download, copy, distribute, print, search or link” to the full text of OA works, although it is expected that they respect the integrity of authors’ work and authors’ rights to be correctly acknowledged and cited (Budapest Open Access Initiative, 2002). Authors can make their work OA in several ways, the most common of which are either to post (self-archive) their work to their own web sites or in an IR or disciplinary repository (DR) created to store, preserve and disseminate their research; or to publish in an OA journal (Drott, 2006).

Works that are self-archived are generally works that scholars give away without expectation of payment, for example works published in traditional peer-reviewed journals or conference proceedings. Self-archiving of this work can occur at the pre-print (unrevised, un-refereed draft, unaccepted by a journal) or post-print (all post publication works including the official published draft) stage. It is generally accepted that works for which an author expects payment, for example books, software, patented work, film and other creative works fall outside the OA realm (Suber, 2003). Harnad, et al., (Harnad et al., 2004) have dubbed self-archiving the “green” road to OA, as opposed to what they termed the “gold” road, which focuses on converting journals to OA. These options and variations based upon them will be discussed in Chapter 2. This thesis looks at the green road to OA and the resulting transformation of scholarly communication. .

1.2 DEFINITIONS AND SCOPE

As Borgman (1990; 2000; 2007) explains; scholarship, or scholarly research is a social process; research is incomplete until it is shared with others. To be shared the scholarly research must be communicated, used, disseminated and developed within a community. This is a process which Kling and McKim (1999) refer to as “scholarly communication”. Scholarly communication can occur through formal and informal channels. Graham (2000) characterized scholarly communication in three channels: informal networks, often called the “invisible college” (Crane, 1972); initial public dissemination, for example via conferences or preprints; and formal publishing through journals and other similar outlets. This research will look at the formal, and rather narrow, segment of scholarly output, specifically scholarly articles intended for publication in journals and other similar outputs such as edited books and conference

proceedings. The phrase “scholarly publishing” in this research refers only to the latter narrow subset of the scholarly communication system.

An IR, in the context of this research, is a web based database or repository of scholarly material where the content is institutionally defined. Similarly a disciplinary repository (DR) is a web based database or repository of scholarly material which is defined by discipline, such as the Social Science Research Network (<http://www.ssrn.com>) distributing social science research or arXiv (<http://arxiv.org/>) catering for the physics, mathematics, nonlinear sciences, computer sciences and quantitative biology communities. Repositories are essentially IT-based systems designed to represent, classify, archive and enable search of scholarly works, and thereby support researchers in providing access to their research via the Internet and other IT infrastructure, for accessibility and impact.

OA, via OA journals and DR and IR, has been proposed as an IT enabled solution to increase access to scholarly publications and treat them as a public good. Increased access to scholarly work would appear to be in the interests of scholarship generally, individual researchers and their institutions. However, despite being suggested and promoted since around 1994 and seemingly providing a common sense solution, except in a few disciplines and institutions the uptake of OA by scholarly authors has been slow (Mark Ware Consulting Ltd, 2004). Estimates vary from 11.3% (Björk et al., 2008), 20-30% (Guédon, 2006) to 5-25% (Hajjem et al., 2005). These findings are surprising and have not been explained.

It is argued that institutions such as universities are the appropriate places to establish OA repositories, as it is increasingly important for them to document and share their scholarship, as they have staff skilled in information management in their libraries and IT departments, and they have the resources and infrastructure to set up, support and fund repositories. They can mandate or encourage self archiving and they can benefit from the enhanced profile (Horwood et al., 2003; Lynch & Lippincott, 2005; Pinfield, 2005; Cochrane & Callan, 2007). However to understand the transformation of scholarly communication there are other stakeholders in the OA debate who all need to be considered. In addition to universities, their libraries and individuals, including scholars (as readers, writers, editors and referees), librarians, organisational administrators, practitioners, patients and the learned layperson; other stakeholders include research funders, publishers (both commercial and learned society), and disciplines and scholarly communities around the world.

Further, as will be reported in Chapter Two in more detail, there is much research on OA and IR of a technical and quantitative nature, such as design research developing and testing software and other tools to support OA and IR, and studies comparing the citation counts of OA and non-OA works, which largely support the hypothesis that OA offers a citation advantage to authors. There are also a number of surveys (Swan & Brown, 2005; Rowlands & Nicholas, 2006) and an ethnographic study of the work practices of authors, users and potential users of OA and IR (Foster & Gibbons, 2005). These studies identify reported barriers to OA and IR, some of which are of particular interest because they report that authors say they agree with the idea of OA, identify barriers which they say prevent them from self archiving, and yet state they would self-archive if their institution mandated deposit (Swan & Brown, 2005; Kennan, 2007). Other than some research which identified OA and IR as disruptive technologies (Lafferty & Edwards, 2004; Lafferty, 2005) I have identified little in-depth qualitative research on this subject framed in a theoretical context. An in depth investigation of the phenomena in question is therefore likely to prove illuminating.

One approach that I believe would offer more understanding of scholarly publishing, OA and IR is to look at these phenomena as socio-technical or socio-material systems -- that is as complex systems comprising of people, technologies and other material things. I found no research on OA and IR in this vein, although (Park, 2008) proposes it as a useful approach.

This research is at the intersection of information systems and information science. While I recognise that any attempt at the definition of a field is likely to lead to debate (Saracevic, 1999), brief definitions will be provided to situate this study. Information Systems (IS) is the academic discipline concerned with the development, use, application and influence of information systems in organisations and society. The IS discipline is evolving as information technologies and systems permeate more of our work and personal lives it is increasingly becoming concerned with not just the technology but also business and social relationships and the implications of these systems (Cecez-Kecmanovic, 2002). Similarly information science is an inter-disciplinary field primarily concerned with the science of information – its collection, classification, manipulation, storage, retrieval, communication, economics, and dissemination at individual, organisational and societal levels (Summers et al., 1999). Some might argue that information systems, while looking at both the social and technology, focuses on the technological systems, and information science, while also looking at both the social and technology focuses on the information. But both are inextricably intertwined with people, information and technology (Saracevic, 1999; Cecez-Kecmanovic, 2002). Both fields have

much to say and much to contribute to the scholarly publishing debate. They are related and intertwined. In concert with my predecessors in this field of enquiry (Kling & Covi, 1996; Kling & McKim, 1999; Kling & McKim, 2000; Kling & Callahan, 2003; Kling et al., 2003), I draw from both.

Both fields draw from a number of reference disciplines which are diverse, encompassing a broad range of philosophical approaches, questions, methods, concepts and theories that provide methods and tools to help us understand the issues under discussion (Hassan & Will, 2006). One of the reference disciplines is sociology, more specifically science and technology studies. From this area (Law 2004) suggests that traditional approaches to research in sociology and science and technology studies are extremely good at what they do, but that they are “badly adapted to the study of the ephemeral, the indefinite and the irregular” (p.4). OA and IR may or may not be ephemeral, but they are indefinite and irregular, not yet black boxed and of uncertain future. For studies such as these Law suggests researchers consider approaches which have a “broader or more generous” sense of method.

As this research investigates the relational, emergent phenomena of OA and IR, I elect to use Actor-Network Theory (ANT) as my theoretical lens and methodological approach. More detail on ANT and its appropriateness for this study is covered in Chapters Three and Four. To test my assumptions about the applicability of ANT to the study of scholarly publishing, and in particular OA and IR, I used Latour’s three tests for ANT membership: non-humans have to be actors with a type of agency; the explanation is unlikely to be “social”, that is no hidden social force is offered in explanation; and, that in addition the study aims at reassembling the social (Latour, 2005: 10-11). The reviewed literature in Chapter Two, the existing writing on OA and IR suggest that non-humans have agency, that there is unlikely to be an explanation in extant social theory and that scholarly publishing, OA and IR are in the process of being reassembled. For example, the potential for free and open communication enacted by the Internet opened the black box of scholarly publishing to new networks for publishing and communication. I adapt ANT as an approach and a method which enables me to fathom some of the complexities and controversies of scholarly publishing and its relations with OA and IR. Using ANT I will explore the process of change by tracing the range of heterogeneous actors in scholarly publishing, OA and IR through their associations and transformations.

1.3 RESEARCH MOTIVATIONS

As both a practitioner and a researcher I have seen the growth of the costs of access to scholarly publishing, followed the debate on scholarly publishing and OA and struggled to provide access to users within financial constraints. As a researcher I have experienced difficulty accessing publications of interest. Accordingly I was intrigued to seek deeper understanding of OA and IR and underlying transformation of scholarly communication. More than that, I was attracted to the ideals of OA and believed that deeper understanding of OA and IR practices would be beneficial to researchers, to the production and dissemination of research output, as well as to society.

One of the central tenets of ANT is that the actors make everything, including frames, theories, contexts etc. On commencing the study I assumed that following the actors involved in OA, IR and scholarly publishing will “render the social connections traceable” (Latour, 2005 :31) and that some actors make other actors do things by “generating transformations” (Latour, 2005: 122). This research aimed to follow those transformations, or lack of transformation down the road to increased understanding.

There are many surveys of users and potential users, citation analyses positing a probable connection between OA and increased citations of work, and developments and implementations of OA IRs. At the same time there are few (if any) empirical studies seeking to understand and explain what happens during the implementation and use of an OA IR and how it affects the stakeholders and their connections with the scholarly publishing process. There are calls for research into evolving research practices, research infrastructure, including IR, and scholarly communication needs (Houghton et al., 2003). Tenopir (2003) suggests some broad areas for research arising out of the electronic publishing phenomenon. Related questions arise: Do collections of articles (often offered through third party aggregators or IR) offer value over separate collections of journals from publishers? Is the old model of a journal obsolete and ready for replacement by eprint servers or aggregator databases? With these other researchers, I believe that social research in this area will make a contribution to our understanding of OA and IR, and the changes that are occurring in scholarly publishing.

1.4 RESEARCH OBJECTIVES

Scholars, universities and publishers are uncertain about the future of scholarly publishing, OA and IR. The objectives of this research are therefore to:

- Contribute to the broad understanding of the roles that OA and IR are playing in the transformation of scholarly publishing
- Provide a deeper understanding of the implementations of OA IR and the resulting changes in the research communities they inhabit, based on purposefully selected cases; one of which is a new implementation and the other a mature one; the first relying on voluntary contributions, the other compulsory, where deposit is mandated by university policy.
- Contribute to the adoption of the sociology of technology, especially ANT in the Information Systems and Information Science disciplinary domains.

1.5 OUTLINE OF THIS RESEARCH

Chapter Two provides a brief background to scholarly publishing followed by a summary of the relevant technological development that have enabled the consideration and enacting of OA and IR. It then provides detailed descriptions of OA and IR and reviews the existing literature. The literature review reveals that while there are many design research reports of technologies to work with OA and IR, many studies contributing towards the arguments that OA provides papers with a citation advantage, and many surveys of researchers and other studies on the spread of IR, and the difficulties of engaging researchers to deposit in them. However, I found no in depth qualitative social research.

Chapter Three begins by briefly describing the ongoing theoretical discourse of the information disciplines. I then describe a relatively new approach, ANT and explain why I have chosen it to assist in increasing understanding of scholarly publishing, OA and IR. Finally, from the material in the literature review and in this chapter, the research questions are framed.

Building on Chapters Two and Three, Chapter Four briefly summarises the ontological and epistemological positions underlying this study, then describes the nature and characteristics of the ANT field study conducted to answer the research questions. It discusses some important methodological issues grappled with in the course of the study. The research strategy undertaken is discussed, beginning with the rationale for the selection of cases which are introduced, and one way of operationalising ANT is proposed which was utilised for the conduct of this study.

In Chapter Five the key actors who operate in scholarly publishing generally and who therefore appear in both cases are introduced. The actors with a role specifically in one case or the other

will be introduced later as we discuss each case in Chapter Six. In a departure from the usual reporting of research, I have experimented by giving the actors voices of their own, that they may tell their own story.

The results of the ANT Field Studies appear in detail in Chapter Six. Results and discussion are combined, and interview transcripts, quotation from project documents and other empirical materials are used extensively to illustrate how the IR projects enrolled actors within their universities. It investigates which actors played a role in enrolment or anti-enrolment, at how enrolment was resisted or performed. It looks at how [relatively] new actors to the publishing world, OA and IR, are seeking to shift the alliances of researchers from their traditional publishing practices to make their work openly accessible.

Chapter Seven builds on the finding in Chapter Six that researchers participate in many overlapping, demanding actor networks in their scholarly publishing, particularly the traditional scholarly publishing network, and their disciplinary and institutional networks. The major arguments proposed here are that OA is a vision that has qualities that make it hard to argue against. However it is perceived differently by researchers and thus is enacted differently. There are many barriers to its adoption which in ANT terms we view as anti-programs working against the programs of OA and IR. One ally is examined, a rhetorical actor in the form of a Mandate (a policy requiring researchers to deposit in the IR), which serves to translate the multiple views of OA into one coherent institutional view and thus encourages, persuades, entices, researchers to place their research outputs into the OA IR. The final story developed here is that technology has an agency afforded by its developers but it also develops agency of its own as an incarnation of the OA vision. It is proposed that the IR itself can act as an ally for OA, when it is afforded with characteristics that provide feedback to researchers and in turn it evolves and changes in response to researcher feedback, working to enable researchers of many disciplines to be inspired by, and act upon, the OA vision.

Chapter Eight concludes the research activities associated with the methodology outlined in Chapter Four, but it does not conclude the stories associated with scholarly publishing, OA and IR. These have ongoing stories with continuing reassembling, contests and re-configurations. In Chapter Eight I summarise the findings of my research, explicating what I believe to be my contributions to theory and to practice. Chapter Eight also outlines limitations to the research and proposes suggestions for possible future research directions.

CHAPTER 2

2 LITERATURE REVIEW AND ANALYSIS

There has been a technology shift that shows in some respects what we are doing with thousands and thousands of journals that begin here and end there and the whole system that is set up for this brick and mortar world. We wouldn't come up with anything like that if we invented academic publishing today [Professor, Business - Jupiter University].

Scholarly publishing is a complex and rich phenomenon that crosses many disciplinary boundaries both as a field of research and as an activity or process. It is central to the work of academics, scholars and researchers (from here on referred to as researchers). It is currently undergoing rapid change and its future is uncertain. There is a vast literature on scholarly communications, scholarly publishing and the changes, realised and possible, brought about by the development of information and communications technologies such as the Internet and the World Wide Web (WWW). The literature ranges from research studies to advocacy and popular writing, and cannot be covered in full here. Any such attempt would require a study in itself. What will be covered will provide the reader with a background to scholarly publishing, and a brief summary of the technological developments that have influenced the development of OA (OA) and institutional repositories (IR). From there the research already conducted on OA and IR will be covered and the controversies that still exist will be examined.

2.1 A BACKGROUND TO SCHOLARLY PUBLISHING

There are many definitions of scholarship and research. The UK Research Assessment Exercise (RAE) defines scholarship as “the creation, development, and maintenance of intellectual infrastructure of subjects and disciplines, in forms such as dictionaries, scholarly editions, catalogues and contributions to major research databases”. The Australian Department of Education Science and Training (DEST) defines research as “a systematic and organised way of finding answers to questions” (Australian Department of Education Science and Training (DEST), 2005). As Borgman (1990; 2000; 2007) explains, scholarship, or scholarly research is a social process, research is incomplete until it is shared with others. To be shared the scholarly research must be communicated, used, disseminated and developed within a community, a process Kling and McKim (1999) refer to as “scholarly communication”.

The results of research can be documented in a variety of forms from letters and memos, to journal articles and books. It is argued that at present the primary form of scholarly communication is via articles usually published in journals, and book chapters or disseminated at conferences (Kling & Callahan, 2003). However, it is recognised that academia is not one culture, but many, and what is common practice for one discipline or individual, is not necessarily common practice for another (Peek, 1996; Becher & Trowler, 2001; Guédon, 2008). Thus, the story that follows is a generalised one, which may not accurately represent specific practices in each discipline, but provides a generic overview.

The basic system of scholarly communication comprises three parts: informal networks, termed the “invisible college” which includes informal communication in person and through letters, working papers and other grey literature; public dissemination methods, such as conferences and preprints; and formal publications such as journal articles and books (Graham, 2000). This work proposes to discuss predominantly the area covered by formal publications, and thus called scholarly publishing, specifically journals and those articles formalised in conference proceedings, edited books and so on.

Journals grew out of private letters between scholars. Easier to share than private letters, the journal enabled by the development of the printing process, provided a way for scholars to communicate with their peers. Early journals often contained discussions on work in progress, providing opportunities for criticism, refutation and refinement. They also provided a permanent record of that communication. Work thus disseminated and discussed usually ended up in monographs. Later, as travel became easier, face-to-face conferences began to fill the discussion, refutation and refinement role (Peek, 1996; Tenopir & King, 2000). In some disciplines, the popularity of the monograph declined and in many the journal emerged as a key part of the scholarly communication process. In the second half of the twentieth century there was a huge increase in scholarly publishing (Oppenheim, 2008).

Today’s academic journal performs many functions. In general terms, publishing means to “make public” so it can be read by others (Borgman, 2007). Scholarly publishing has additional criteria. The desirable characteristics for the publishing for scholarly work and research output are:

- That research is made public so it is accessible by others in the present and the future;
- That there be some sort of publicity about it so that other interested scholars can be made aware of it;

- That it be trustworthy in that it can be seen to have gone through some sort of peer review or other certification;
- That it registers and acknowledges who carried out the work of the research and writing (termed “scientific paternity” by Guédon (2001)) (Kling & McKim 1999; Prosser 2005; Borgman 2007).

Tenopir and King (2000: 25-26) report on the high correlation between academic achievement and a high volume of journal reading.

To this we should add another, less frequently acknowledged function. Journal publications have become an entrenched part of the academic reward system (Peek, 1996; Prosser, 2005). The academic reward structure for publications typically operates on all or some of the following:

- Counts of the number of papers published by various authors, or
- Counts of papers correlated with journals ranking lists which are often based in the discipline, for example the list produced by the Australian Business Deans Council (2008) or,
- Counts of citations of individual papers, or
- Assessment of the impact factors of particular journals in which an author publishes.

Each measure has its own advantages and disadvantages. Raw counts of papers ignore questions of quality. Journals rankings lists judge the journals, not the individual papers are often infrequently revised and can be slow to adjust to changes in a field. For example, citation counts are hard to measure; there are issues such as how to count negative citations and citations can often more frequently refer to the review literature rather than the original research (Wilson 1999). Not all journals are created equal (Guédon, 2008). How journals are adjudged “quality” is moot. One commonly accepted measure is the journal impact factor (JIF), a measure of importance of scientific journals. JIFs have a huge, but controversial, influence on the way published scientific research is perceived and evaluated (Steele et al., 2006). Impact factors are calculated each year by Thomson ISI for those journals which it tracks, and are published in the *Journal Citation Reports* (JCR). The JIF is generally calculated over a three-year period. For example, the 2003 impact factor for a journal would be calculated as follows (Garfield, 1994 (amended 2004); Garfield, 2005):

Year 2003 citations to 2002 + 2002 articles
Articles published in 2001 + 2002

There are a number of criticisms of ISI impact factors being used to judge journal quality, an important one being that research outputs in humanities, arts and social sciences are often published in books (and indeed other formats) rather than journals, and ISI rarely produces citation counts and therefore Impact Factors for books. Similarly, arts, humanities and social science journals that do exist, even those highly regarded by scholars, are often not included in ISI databases which are heavily biased towards the sciences (East, 2006).

All of these measures serve to entrench the role of the journal, the JIF most specifically as it is the “impact” of the journal that counts, not the impact of the individual paper (Prosser, 2005; Rodriguez et al., 2006). Research evaluation procedures, such as RAE in the UK and the proposed Excellence in Research Australia (ERA), underpin the notion that publication has as much to do with career progression as it does with the dissemination of research. Further, the culture of top-tier journals, and the power of monopolistic journal publishers act as disincentives for authors and other actors to investigate alternative models (Graham, 2000).

In addition to these first order functions of scholarly publishing, Prosser (2005) also finds second order functions for scholarly publishing. For example, access to wider readership (such as the interested lay person or practitioner) or access for funding bodies and institutions to assess research and make decisions about future research funding. Prosser also refers to third order functions. Here he speaks as a scholar, not a publisher, for in this category he places profit and surplus, which had he shareholders to satisfy, he may have classified as a first order function.

Different actors have different roles within the scholarly publishing environment. For example, academics and scholars write the articles in the first place and paradoxically they are also the main targets as readers of those same articles. They also provide the certification through peer review. The journals provide the registration of a work. Multiple organisations provide awareness and accessibility, from the journal publishers themselves through their marketing departments and subscriber lists to commercial indexing and abstracting organisations and libraries. Archiving is provided by publishers to some extent (depending on their storage facilities and continuing existence) but also by libraries. Libraries also provide access to wider readerships, through walk-in access to the public and inter-library loan and document delivery. Profits are invariably made only by the publishers directly, although one may argue that

academics and scholars profit indirectly, through increased reputation, grants, tenure, promotion and so on (Kling & McKim, 1999; Graham, 2000; Kling & Callahan, 2003; Björk, 2005; Prosser, 2005).

A number of writers have tried in very different ways to define and visually represent the scholarly publishing process. Examples include UNISIST (1971 reported in Søndergaard et al. 2003); a revised UNISIST (Søndergaard et al., 2003); Garvey and Griffith (1972 reported in Hurd, 2004); Hurd (2004), Björk (2005) and Warner (2005). Most of these models are linear and sequential. Björk, for example, focuses on the concept of a scientific communication life cycle, which he presents as a formal, very detailed and complex model with a hierarchical structure including the whole scientific communication value chain. Warner (2005) represents the scholarly communication value chain as rather super-ordinate functions.

On the basis of the literature reviewed I have integrated the core of the different approaches. My conceptual model presents a simplified but representative picture (Figure 2-1) which illustrates that scholarly publishing is a cycle that starts with research and writing, moves through certification and peer review to registration on publication. Once the work has been published it is made available to readers via publishers' subscriptions, libraries, and third parties such as listings in indexing and abstracting services. Once available it is, in the best possible world, used by fellow researchers to feed back into the research and writing cycle. Copies are also archived in libraries and sometimes by publishers for future reference, so it may at a later time, be called back into the cycle. Other activities emerge from the central cycle:

- Access is available for a wider readership, such as practitioners, patients, future research funders;
- Published work is a part of the academic reward structure (which can influence whose work and what work may be funded in the future);
- And publishers make a profit.

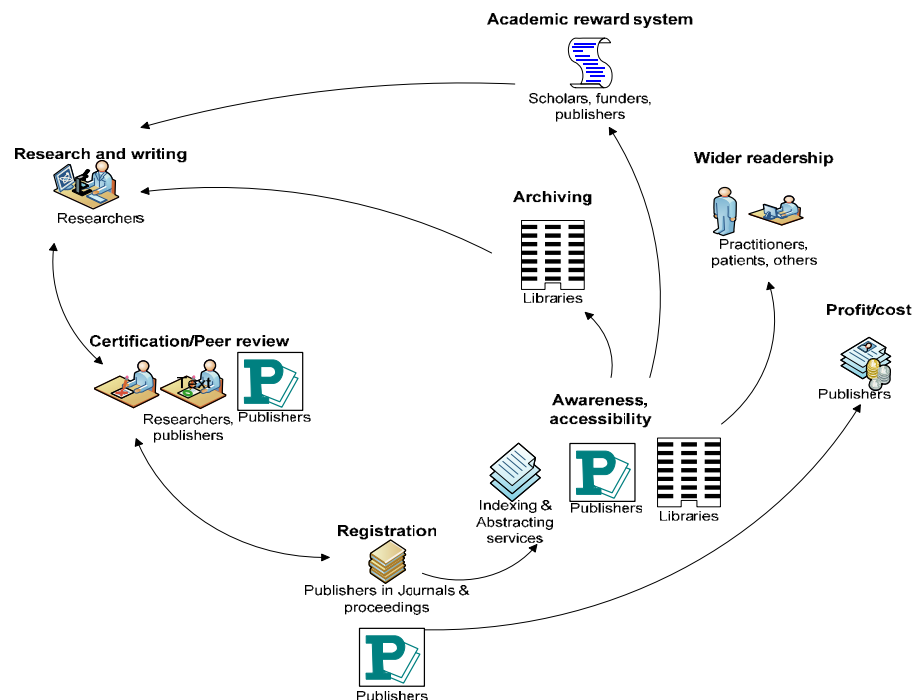


FIGURE 2-1: TRADITIONAL SCHOLARLY PUBLISHING

Changing technologies from the 1970s have seen the dominant form of information provision change from printed journals to online or electronic provision. Online or electronic publication refers primarily to the distribution medium (Kling and McKim, 1999). Søndergaard et al., (2003) propose an updated version of the UNISIST model which considers the Internet's effects, for example enclosing the model within a punctuated ellipse as representative of the open boundaries of the domain. The other models previously mentioned also consider technology and the Internet, but remain largely linear and hierarchical. My conceptual model for electronic scholarly publishing (Figure 2-2) remains cyclical and, when compared to the model of traditional scholarly publishing, mainly contains changes in the awareness, accessibility, distribution, and publicity activities of the process. The online provision of scholarly publications comes in many formats, for example in individual electronic journals, publisher collections of journals, aggregator collections of articles (often subject based and provided by commercial organisations as an adjunct to their existing indexing and abstracting services), or OA discipline or institution based repositories (Tenopir and King, 2000). While the dominant form of accessibility and distribution has changed from paper to electronic, the overall functions and roles within the system do not seem to have markedly changed. Individual

subscriptions or shared subscriptions in libraries are still generally required for access, with the reader additionally requiring new actors such as Internet access and a computer. While the major access channel has changed in recent times from paper journals to online access, not much else has changed as demonstrated in Figure 2-2.

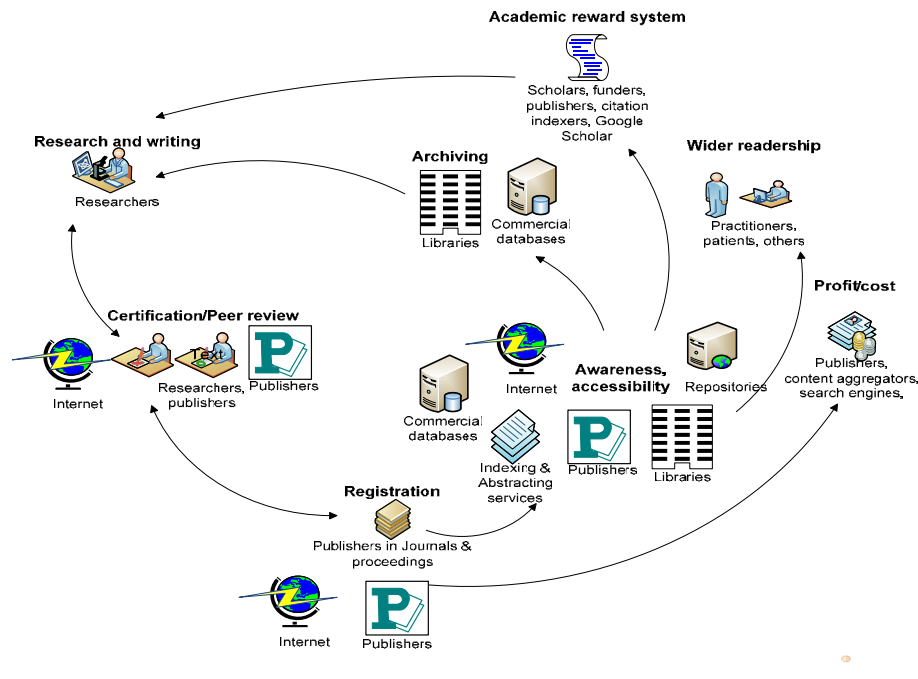


FIGURE 2-2: ELECTRONIC SCHOLARLY PUBLISHING

Before the reader asks, did I forget about all the new ways of communicating the Internet has fostered such as e-lists, blogs, wikis and so on, let me just reiterate that this thesis is focusing on the formal aspects of scholarly communication – that is scholarly publishing. The above listed technologies are, for the present at least, more associated with informal scholarly communication.

2.2 THE ROLE OF LIBRARIES IN SCHOLARLY PUBLISHING

Libraries assist readers and authors with tools for locating, purchasing, arranging, and filtering the scholarly literature. They subsidise publishers and indexing and abstracting services through subscriptions (Peek, 1996). In the past, libraries within research institutions have been responsible for the preservation of the content of journals for the future (Pinfield 2005). How researchers locate and retrieve previous research has undergone substantial change over the last thirty years – change that has largely been driven by technology. Academic libraries have

traditionally acted as repositories by making accessible and archiving for future accessibility works of scholarly publishing. They have increasingly done this in a web based manner. For centuries libraries operated as gatekeepers, preservation experts and information providers in a paper paradigm, where the library kept paper copies of books and journals containing previous research, and the tools and knowledge with which to access their own resources and resources from other libraries.

In the paper paradigm the library was a building holding tangible items such as books and journals. In the new paradigm libraries provide an electronic web-based interface with an invisible infrastructure to enable the provision of information to inform research (Borgman, 2003; Brophy, 2008). The costs and labour of acquiring and managing the purchases of content, or in some cases the current and future access rights to it are generally unseen by users. As is the development and maintenance of the technological infrastructure.

This brings the discussion to one of the problems inherent in the system; that is the phenomenal growth in the amount of information and specifically in the number of journals available. This was once called the “information explosion. Moreover, the costs of those journals, far outstrip the ability of individuals, libraries or institutions to afford all journals, conference proceedings etc., let alone all journals in a particular subject field (Odlyzko, 1996; Graham, 2000; Guédon, 2001; Van de Sompel et al., 2004b; Prosser, 2005; Steele, 2005; Oppenheim, 2008). Indeed, Tenopir and King (2000) report a relationship between the increasing numbers of journals and rises in journal prices, to subsequent cuts in the number of personal subscriptions to journals. In turn, these cuts in individual subscriptions lead to increased prices for continuing subscribers such as libraries, which, in turn, force them to reconsider and sometimes cancel some of their subscriptions. This limits researchers’ ability to both consult, and contribute to the research literature. This is particularly true in the world’s poorer nations (Davison et al., 2005). Not only are the costs of subscriptions to journals prohibitive, but there is also the lack of technology to access electronic resources and this contributes to the “digital divide” (Willinsky, 2005). No one claims that journals should be published free of cost, unless they are subsidised by an institution or other body (King & Alvarado-Albertorio, 2008). The costs of journals is widely discussed Topics include the role of fixed costs, and the dependency of cost on the number of subscriptions, the number of articles published per journal and the changes wrought by electronic publishing such as bundling, differential pricing, the rise in numbers of new journals and so on (Tenopir & King, 2000; King & Alvarado-Albertorio, 2008).

As the number of journals and their subscription costs increased, scholars have become increasingly dependent on libraries to provide them with access to journals (Hurd, 2004; Dewatripoint et al., 2006) and it is increasingly difficult for any institution or organisation to provide access to all, or even most of them. The bigger publishers have responded with the “Big Deal” where libraries purchase a licence to access a bundled collection of journal titles from publishers rather than selecting individual titles. The “Big Deal” is designed to increase access and decrease costs. However, the jury is still out regarding the usefulness or otherwise of the “Big Deals”. “Big deal” licences can restrict access to independent scholars and distance students or distributed campuses and limit inter-library loans. They often force libraries to purchase a big publishers bundle rather than the actual journals the organisation requires and can place constraints on cancellations which mean libraries are tied to subscriptions over time with big publishers, and journal subscriptions from smaller publishers such as learned societies may suffer. Collections lose differentiation, and an organisation’s collection is diluted with titles it may not need (Hurd, 2004; Dewatripoint et al., 2006; Ursin, 2007). In addition, technology has advanced so that the information within scholarly peer reviewed journals is available over the Internet at the individual researcher’s desk top. It is not the intention of this work to investigate costs, pricing and the economics of scholarly publishing, nonetheless, costs and pricing must be acknowledged as actors in the developing story.

Authors generally receive no royalties or fees for their work that is published in scholarly journals. So much of the work for which publishers receive payment is in fact conducted voluntarily by members of the academic and research communities, as the initial researchers and writers, and then as editors and reviewers. Scholarly output for which the author may receive direct payment, such as books, films, or patentable work, remains outside this discussion. While not receiving direct payment, readers and citations bring academic authors the rewards of employment, promotion, tenure, grants, and prestige. As was noted earlier in this review scholarly research output is also often used as a performance indicator and a criterion for distribution of funding for both individuals and institutions (Houghton et al., 2003).

Further, the publishing of articles and papers can be held up at many stages even after the research is complete and the draft sent to a publisher thus causing delays in dissemination of results. Editors allocate to reviewers, reviewers review, scholars rewrite, and editors make final decisions. Papers can be held up at each stage. Publication schedules for paper journals (and electronic journals based on the paper paradigm) are fixed to rhythms more related to

commercial expedience than to the needs of the scholarly community, so the length of time to press can be long (Peek, 1996; Van de Sompel et al., 2004b). In the current model, as most electronic journals are only licensed (in effect leased) to libraries, the preservation is up to publishers. There is concern that the imperatives of the commercial world will mean that there is likely to be no proper concern for preservation archiving. While some argue that the IR movement is about access not preservation others argue that preservation is one of the key issues that could define an IR (Pinfield, 2005).

Thus, the increasing availability of journals and other publications over the Internet has been heralded as a new paradigm of electronic publishing. Currently, however, it is similar to the old paradigm. Similar structures are in place and similar costs are involved. Any financial profit to be made from the journals is made by the publishing companies and their shareholders in return for the services they offer such as managing peer review, marketing, dissemination and distribution. While both paper and electronic paradigms are still in existence, publisher's revenue is from subscriptions to the paper titles and increasingly from subscriptions and site licences. These subscriptions and site licences may apply to individuals, institutions and on-sellers or aggregators for electronic titles, or collections of titles locked behind firewalls. In addition to escalating costs, publishers and aggregators concerned about their revenue stream use copyright legislation and licensing agreements (contracts) to limit what libraries may do with the licensed electronic journals they pay for. Thus access to electronic journals is restricted far beyond the limitations that were placed in the print paradigm. For example, some licences restrict access to electronic journals for Inter-Library Loan/ Document Delivery and/or to walk-in users in libraries. It has been argued that these cost and permission barriers work against the interests of researchers. The organisations to which researchers belong, which potentially share the rewards of research impact also find these permission barriers working against their interests (Houghton et al., 2003; Suber, 2003; Houghton & Sheehan, 2006). Costs to readers or their access agents (libraries) are spiralling increasingly higher and universities and other research organisations can afford to purchase increasingly smaller percentages of available scholarly journals (Houghton et al., 2003; Suber, 2003; Drott, 2006). Thus what was previously a distribution network, is now in fact acting as a barrier to readers (Pinfield, 2005).

2.3 EXPECTATIONS CREATED BY NEW INFORMATION AND COMMUNICATION

TECHNOLOGIES

The previous section refers to some of the changes in scholarly publishing that have come about as a result of change and development in information and communication technologies (ICT), particularly the Internet and the World Wide Web (WWW). These technological changes have created high expectations for improvements in scholarly communications (Kling et al., 2003) and scholarly publication (Kling & Callahan, 2003). From the 1990s it was envisaged that electronic publication, enabled by ICT developments, would:

- Make materials available to readers 24 hours a day,
- Ensure that costs would be lower as there would be no need to print hardcopies and it is cheaper to store electronic materials than paper,
- Assist publication to be more timely as communications were improved,
- And, enable a wide variety of document formats and other media to be included.

It was envisaged that these potential benefits would lead to participation in scholarly publishing to be more open and democratic and the outputs to be available to a wider audience.

2.4 OPEN ACCESS & INSTITUTIONAL REPOSITORIES: DEFINITIONS AND BACKGROUND

2.4.1 OPEN ACCESS

Let us revisit our earlier definition of OA. For the purposes of this research, a widely accepted definition of OA (Budapest Open Access Initiative, 2002; Drott, 2006) is adopted and refers to work that is freely available to users via the Internet without financial cost or legal or technical barriers. Users can “read, download, copy, distribute, print, search or link to” (Budapest Open Access Initiative, 2002) the full text of OA works, although it is expected that they will respect the integrity of authors work and that authors rights will be correctly acknowledged and cited. OA literature is free of charge to the user and the copyright holder consents to unrestricted use (Suber, 2003), but someone has to pay the costs for the infrastructure and maintenance.

Willinsky (2006) develops the case for what he calls principled OA which he defines as “a commitment to the value and quality of research [which] carries with it a responsibility to extend the circulation of such work as far as possible and ideally to all who are interested in it,

and all who may profit from it” (p. xii). He posits ten flavours of OA, based largely on how the particular flavour of OA is financed and dependent on the nature of the access provided. Some of the flavours contravene the most open of OA definitions, but they all increase access over the previously existing models of scholarly publishing. The flavours he describes are:

1. Home page OA (available but often buried and rarely indexed)
2. OA e-print archives (organised around an institution or a subject or discipline, usually managed and indexed)
3. Author fee OA (journals charge the authors rather than the readers)
4. Subsidized OA (where journals are subsidised by societies, institutions, government agencies or foundations for example and charge neither authors nor readers)
5. Dual mode OA (charge for the print edition, provide free electronic)
6. Delayed OA (journals sell subscriptions to print and electronic versions but offer OA after a period of time, typically six or twelve months)
7. Partial OA (journals make a small number of articles OA in each edition)
8. Per capita OA (publishers provide access to researchers in developing countries through programs such as the World Health Organisation’s HINARI project)
9. OA indexing (indexes are made available OA with the full text pay per view, or web crawlers index OA resources).
10. OA cooperatives

This research focuses on flavour 2, IR. Repositories, which may be either institutional or disciplinary (known as the “green road” to OA) and which utilise free open source or even proprietary software (Harnad et al., 2004; Swan et al., 2005) have been regarded as a legal and powerful way to provide OA to the scholarly corpus. Why focus on repositories? This will be discussed in Section 2.3.3.

As OA grows more prolific it attracts the interest of research funders, such as universities and other research institutions, private funders such as the Wellcome Trust (Wellcome Trust, 2003; Wellcome Trust, 2004), and governments (the biggest providers of research funds). A United Kingdom (UK) Government Inquiry questioned how the output from publicly funded research could be handed free of charge to commercial organisations that increasingly make it difficult to access the publications resulting from the research (Poynder, 2004; Gibson, 2005). More

recently, in December 2007 a law was passed in the USA requiring that grantees of funds issued by the National Institutes of Health (NIH), which distributes \$29 billion a year in research grants, deposit their resulting scholarly articles in an OA repository within 12 months of publication (Van Orsdel & Born, 2008). In the OA literature these requirements to deposit are collectively referred to as mandates.

Benefits of OA for authors are clear – it lowers access barriers and disseminates research quickly. For readers, access is also quick and easy from their desktop via common search tools or even from some repositories email alerts (Pinfield, 2005). However, for commercial and society publishers the benefits are less clear. In the early days of OA some, journals (notably the *New England Journal of Medicine*) went so far as to refuse to consider articles which had previously been “published”, including being posted online—citing the Ingelfinger Rule (named after the editor who established the rule against previous “publication”) (Harnad, 2000). However, there is little or no evidence to date to suggest that such posting is affecting journals (Morris, 2004). Despite this, publishers are wary of what OA may mean for them and their revenues. Among other activities some have hired the “pit bull” of public relations to assist them through one of their organisations, the Association of American Publishers to “take on” the OA movement (Giles, 2007).

2.4.2 OPEN ACCESS JOURNALS

OA journals (known as the “gold road” to OA) are journals where all the content of the journal is freely available to readers. Costs are recouped in many different ways, for example, by author fees, or by institutional or organisational subsidies, as suggested in Willinsky’s (2006) ten flavours above. Indeed, many commercial publishers offer hybrid open and subscription based access, funded in different ways, for example author or funder sponsorship (Suber, 2006). Thus there are many business models for OA journals.

The number of OA journals is rapidly growing. The *Directory of OA Journals* (DOAJ) currently lists 3,683 journals¹ up from 2,961 it listed in 2006 as reported by Björk et al. (2008). DOAJ was established as a comprehensive directory of quality controlled OA journals by the Lund University library after the First Nordic Conference on Scholarly Communication in Lund/Copenhagen in 2002. Quality in the DOAJ sense includes editorial quality control as well as peer review, so the number of actual peer reviewed OA journals is likely to be somewhat fewer than the 3,683 suggested. A study (Björk et al., 2008) cross checked the number of OA

¹ <http://www.doaj.org/>

journals in DOAJ with those listed in Ulrich's Periodical Directory². Ulrich's listed 1,735 as OA refereed. However interesting, OA journals are not the focus of this study, repositories are, and to them I now turn.

2.4.3 REPOSITORIES

In the scholarly publishing context, repositories are digital library or digital archives with capabilities to publish to the Internet. Repository software is often open source or free, for example EPrints³, Fedora⁴ and DSpace⁵ although some commercial repository products are also available such as Digital Commons⁶ and DigiTool⁷. As the developers of EPrints say, EPrints [and other repository technologies] are "both a practical tool and the crystallization of a philosophy. It enables research to be accessible to all."⁸ Repositories rely on information technology (IT) infrastructure, the Internet and web based software and services designed to enable researchers to upload their research output and provide OA to them. Repositories can be based in institutions and called IR, or organised by subject domain or discipline and called disciplinary repositories (DR). Examples of these disciplinary repositories are Social Science Research Network (SSRN)⁹; DLIS and E-LIS (Library and Information Science)¹⁰; or arXiv¹¹ (Physics, Mathematics, Computer Science, Quantitative Biology and Statistics). Some are completely OA such as arXiv, others such as SSRN provide a mix of open and toll (subscription) access materials (Armbruster, 2005).

Repositories, either institutional or disciplinary, are known as the "green road" to OA (Harnad et al., 2004). The term commonly used for depositing ones work is to self archive. Research output (journal articles, conference papers etc.) can be self archived at either the pre or post peer review stage, in repositories. This facilitates OA to publications which readers can freely access (Harnad, 2003; Houghton et al., 2003; Mark Ware Consulting Ltd, 2004; Poynder, 2004;

² <http://www.ulrichsweb.com/ulrichsweb/>

³ <http://www.eprints.org/>

⁴ <http://www.fedora.info/>

⁵ <http://www.dspace.org/>

⁶ <http://www.bepress.com/ir/>

⁷ <http://www.exlibrisgroup.com/category/DigitalAssets>

⁸ <http://www.eprints.org/software/>

⁹ <http://ssrn.com/>

¹⁰ <http://eprints.rclis.org/>

¹¹ <http://arxiv.org/>

Bosc & Harnad, 2005; Pinfield, 2005; Sale, 2005a). Works that are self archived at pre- or post-print stage are generally works that scholars give away without expectation of payment, for example versions of papers published in traditional peer reviewed journals or conference proceedings (Suber, 2003). Further, those that are archived at the post-print stage are still relying on the peer review and reward and recognition systems of the journal. Green OA works in conjunction with traditional scholarly publishing. Its focus is to provide access, not all the functions provided by a journal. Pinfield (2007) reports that in fields with the most long standing repositories such as physics, once the journal is published and for citation purposes, users prefer the journal article to the repository content. Further, repositories rely on journals for registration and certification. The two systems, at this point in time anyway, require coexistence.

The term self-archiving is in common use in the OA movement where it refers to the practice of researchers depositing their works online in OA repositories as mentioned above. This is a variation on usual definition of archiving; in the more traditional sense an archive is either a place in which public or historic records or documents are stored; or in computing where archiving refers to storing infrequently used files (Oxford University Press, 1989). Further, the “self” in self-archiving can be a misnomer as self-archiving can be performed not just by authors, but by administrative or library staff or other “proxies” (Xia & Sun, 2007; University of Southampton School of Electronics and Computer Science, Undated), or even by harvesting researcher web sites.

Scholarly material made available on the Internet, for example via researchers’ personal web pages, faces the risk of becoming lost amongst the myriad of other resources and applications of the Internet. Accordingly, the Open Archives Initiative (OAI) has established a protocol (or standard) to enable the metadata (indexing information such as authors name, papers title, date of publication) to be gathered or “harvested” from repositories and other research databases. Most repositories adopt this protocol. This is known as the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). OAI-PMH enables a repository, journal or publisher to register with an OAI harvester such as the National Library of Australia’s ARROW Discovery Service¹² or the University of Michigan’s OAIster¹³ which allows it to be searched for (and therefore found) by potential users by a number of indexing terms or metadata (Van de Sompel et al., 2003; Van de Sompel et al., 2004a; Willinsky, 2006; Borgman, 2007). In addition,

¹² <http://search.arrow.edu.au/>

¹³ <http://oaister.umd.umich.edu/o/oaister/>

other search engines focus on scholarly publications for example Google Scholar¹⁴. The repository, journal or publisher needs to register with these services, and thus provide a way for potential users to access works.

2.4.3.1 DISCIPLINARY REPOSITORIES

There are many disciplinary repositories, some of which are very successful in covering, preserving and making accessible the literature of their discipline. Examples are mentioned in Section 2.3.2. above. Many of these began their lives as pre-print archives¹⁵. These have been developed mainly in fields where time to publication in journals was long, such as economics; or in fields where time to publication was important; or in fields which already had a culture of distributing preprints in paper in pre-Internet times, such as physics. Pre-prints are usually un-refereed drafts (Harnad, 1998; Borgman, 2007). It is argued, however, that as many disciplines are not in a position to set up such repositories. They may not have the technical expertise, funds, coherence, established preprint culture or desire to invest in such infrastructure. Enter IR, the focus of this study.

2.4.3.2 INSTITUTIONAL REPOSITORIES

This research focuses on IR. It is argued that institutions such as universities are the appropriate places to establish repositories, as it is increasingly important for universities to document and share their scholarship, and because the world needs effective IR for scholarly communication. Universities have staff skilled in information management in their libraries and IT departments, and they have the resources and infrastructure to set up, support and fund repositories. They can mandate or encourage self archiving and they can benefit from the enhanced profile (Horwood et al., 2003; Lynch & Lippincott, 2005; Pinfield, 2005; Cochrane & Callan, 2007). In the words of Lynch quoted in (Lynch & Lippincott, 2005):

A university-based institutional repository 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. It is most essentially an organisational commitment to the stewardship of these digital materials, including

¹⁴ <http://scholar.google.com>

¹⁵ In the paper paradigm when a journal published an author's work, the author was able to obtain copies of reprints (copies of the refereed, published work) from the publisher which could be sent to colleagues or which interested parties could request. The reprint is now usually in electronic format and has come to be known as the e-print. However e-prints can be both pre-prints (pre-peer review) and post-prints (post-peer review) Post-prints are all post publication works including the official published version, although what is self-archived is usually the final author's version of the post-peer reviewed paper (Harnad, 2003).

long-term preservation where appropriate, as well as organisation and access or distribution.

The literature refers to institutional archives and repositories synonymously, but some authors differentiate repositories which may contain work other than eprints, such as theses, grey literature, working papers, and so on, from repositories designed to promote authors and institutions archiving their own scholarly output for the future (Swan, et al., 2005). Bosc and Harnad (2005) and Horwood et al. (2003) suggest that the establishment of IR should be the role of the library as it complements the already established roles of libraries in providing access to scholarly material and information management and archiving of material and, indeed, in many organisations this is so. In some cases, repositories are restricted to research output, and in others they include other intellectual capital that belongs to the institution, such as teaching and learning materials.

For institutions to set up OA repositories there are a number of issues to be resolved. These include technical issues, such as hardware and software selection, IT and human resources costs, preservation policies and also cultural issues. Institutions and authors need to research and understand the possible benefits and barriers and other outcomes. Examples are the copyright agreements which authors have with publishers which are seen as a barrier to IR, although increasingly publishers are allowing authors to self-archive¹⁶. There are the management costs and resources involved (Swan et al., 2005) and other OA issues which remain unresolved. These are the physical organisation of material, identification of material (i.e. what material is to be deposited in the repository), identification of versions of material, intellectual organisation, copyright and other legal issues, peer review, authenticity, and preservation. Houghton and colleagues (2003) and Genoni (2004) argue that an important issue is quality control.

Genoni (2004) reports an OCLC study from 2003 stating “there is no common view of what an institutional repository is, what it contains, and what its governance structure should be”. Later reports confirm this observation (Markey et al., 2007). Genoni mentions a SPARC¹⁷ study

¹⁶ The RoMEO (Rights MEtadata for Open archiving) project has a web site which unofficially list the OA policies of various publishers at <http://www.sherpa.ac.uk/romeo.php>

¹⁷ SPARC – Scholarly Publishing and Academic Resources Coalition – An alliance of academic and research libraries and organisations working to correct market dysfunctions in the scholarly publishing system (<http://www.arl.org/sparc/> or <http://www.sparceurope.org/>).

suggesting that all kinds of published and unpublished materials such as preprints, theses and dissertations, research centre newsletters etc. be a part of the content profile of IR. Other writers in the field believe that IR should concentrate on refereed research output (Harnad, 2005). This lack of a common view has caused much discussion on the American Scientist Open Access Forum with disagreement between those who think that IR should focus on making research output (from preprint to peer reviewed) available via OA (Sale, 2005b) and those who think that other “digital library” functions are an important part of IR planning and development and may be pursued concurrently (Rowland, 2005). Poynder (2005) neatly summed up many of the issues in a recent posting by questioning what an institutional repository really is. His suggestions are:

- *As a repository for a university's research output, with the aim of increasing access to that research, and so enhancing its impact*
- *As a tool for preserving and curating a university's research output*
- *As a tool to assist a university in its digital publishing ambitions, and*
- *As a tool to enable universities offer digital courseware and online learning services.*

The replies on the e-list varied from one or all of the above to “and more”. This research aims to look at IR specifically as a repository for a university’s research output with the aim of increasing access to that research and as a tool for preserving and curating that research.

2.4.4 OPEN ACCESS AND INSTITUTIONAL REPOSITORIES IN AUSTRALIA

At the time this research commenced, a complete picture of the Australian institutional repository situation did not exist. Australian IR presents an interesting case because the Australian Government has been pivotal in supporting the development of IR. In 2002, in a report to the Australian Government, the Chief Scientist highlighted (among many other things) the importance of the accessibility and dissemination of research (Batterham, 2002). In 2004, as a major funder of research, the Australian Government through the Department responsible for research funding, allocated funds on a competitive basis for the development of research information infrastructure including OA IR in universities. As a result, a number of universities and consortia began repository testing and implementation from this time (Australian Department of Education Science and Training, 2002; Australian Department of Education Science and Training, 2003b; Australian Department of Education Science and Training, n.d.-a). Of the many projects supported, three were directly related to IR:

- Australian Partnership for Sustainable Repositories (APSR),

- Australian Research Repositories Online to the World (ARROW), and
- Regional Universities Building Research Infrastructure Collaboratively (RUBRIC).

The ARROW project comprised of a consortium of universities and the National Library of Australia, which focuses on identifying and testing software or solutions to support institutional repositories, including the development of a Discovery Service by the National Library of Australia. The APSR project focused on issues of continuity and sustainability of digital collections (Henty, 2007). The RUBRIC project was funded to support smaller universities to establish IR using products tested or developed by ARROW and APSR (Shipp, 2006).

In 2003, a Council of Australian University Librarians (CAUL) (Council of Australian University Libraries (CAUL), 2003) survey on IR identified six universities that had established eprint (as opposed to digital thesis) repositories¹⁸. A further 14 universities were considering establishing repositories, and ten responded that they had no plans for a repository. Shipp (2006) reported approximately 9,000 items in the 14 repositories in existence in January 2006. Recent research conducted in conjunction with this thesis (Kennan & Kingsley, 2008) found from a survey of all 39 Australian universities conducted in September 2008, that 32 institutions have active repositories and by end of 2009, 37 should have repositories, of which 36 will be OA. Only 11 of their respondents reported their repository holdings, but, these 11 reported 32,900 full text journal articles and conference papers alone of which 9,000 belong to the Queensland University of Technology, the institution with the longest standing Mandate requiring researchers to deposit their work. Thus it can clearly be seen that the total number of items has risen dramatically in the one and a half years since Shipp's report, even when the full text holdings of only a small number of repositories are reported.

However, repository holdings have not grown at the same rate as repositories. This can be seen if one imagines what the holdings of Australian repositories would be if all the publications reported Higher Education Research Data Collection (HERDC) were included. The Australian Government uses data from HERDC about research income and publications to determine future funding allocations. HERDC collects data about certain types of research outputs: books, book chapters, journal articles, and conference publications, not about all the research outputs that may emanate from a university. For example, government reports, technical reports, policy evaluations, symposium presentations and publications aimed at

¹⁸ <http://www.anu.edu.au/caul/surveys/eprint-repositories2003.xls>

practitioners are not reported. The works reported to HERDC must meet strict peer review criteria (Australian Government Department of Education Employment and Workplace Relations, 2008a). If, however, all the research outputs acceptable for HERDC collection were made openly accessible in IR, Australian repositories would have around 43,000 deposits for 2006 alone (Universities Australia, 2006). Thus, deposits in repositories have not kept up with the development and implementation of repositories.

More recently research evaluation exercise called ERA is being implemented across all universities. One aspect of this project, titled “Accessibility of Publications” will require universities to develop repositories to support OA (Harvey, 2008). In addition, the government allocated \$25.5 million to Australian universities in the 2007-2009 funding period for the development of IR for the reporting of publications (Australian Government Department of Education Employment and Workplace Relations, 2008b). Repository use is also being encouraged in other ways. In 2007, the two largest research funding bodies in Australia requested recipients of their grants place their results in a repository (Australian Government Australian Research Council, 2006; National Health and Medical Research Council (NHMRC), 2008). Despite these considerable incentives, only 22 of the 39 universities had a repository listed on the ARROW Discovery Service¹⁹ in March 2008, and 26 are listed there currently (September 2008). Thus, considerable change is taking place, and has been taking place as this research project has been underway.

2.5 OPEN ACCESS – LITERATURE AND RESEARCH

2.5.1 BACKGROUND

There are many studies, articles, papers and reports on OA and IR. Generally the works discuss the pros and cons of OA and IR and the roles they may play in scholarly communication in general or for institutions specifically. They speculate regarding the possible effects on major stakeholders: libraries, authors, publishers, funding agencies, and governments. There is also much research and other work and the sections that follow can only hope to provide a flavour of it, rather than a complete analysis. There are useful tools available for keeping track of this literature. For example, the MIRACLE (Making Institutional Repositories a Collaborative Learning Environment) Project funded by the IMLS (Institute of Museum and Library Services in

¹⁹ <http://search.arrow.edu.au/>

the USA) provides a bibliography²⁰. MIRACLE is an ongoing project which was established to investigate the development of IR in colleges and universities, and to identify models and best practices in the administration, technical infrastructure, and access to repository collections, also produces an online bibliography.

2.5.2 ACTIVIST LITERATURE

OA does not have a single organisation or society promoting or supporting it (Peek, 2007). Rather, there is a cluster of advocacy, or activist, organisations and individuals which I refer to loosely as the OA movement. These individuals and organisations promote OA through publication (formal and informal) and by example. Physicist Paul Ginsparg founded the Internet's first electronic scientific preprint service, arXiv, in 1991, allowing scientists to share ideas prior to publication. Three years later in 1994, a professor of cognitive science, Steven Harnad, posted on the Internet what he called a "subversive proposal," proposing researchers immediately begin depositing papers to Internet-based archives (Harnad, 1995). The subversive proposal led to extensive debate, some of which is captured in a book edited by Okerson and O'Donnell (Okerson & O'Donnell, 1995). The proposal and the ensuing debate also influenced the OA movement of today. A self styled OA archivangelist Harnad has served as a passionate voice for change, not only as an activist speaking and writing on the subject, but also by participating in, and encouraging the creation of tools for creating OA repositories and enabling their interoperability²¹. Many others have joined him and their voices may be heard, their software used and their publications read, in many places. In 1998 Harnad instigated, and still today remains the moderator of, an electronic discussion list "The American Scientist OA Forum"²² which has been chronicling and often directing the course of progress in providing OA.

Many others also contribute to the work of activists for OA, writing and communicating the OA message, developing software to support OA, implementing repositories, publishing OA journals, communicating the OA vision. They are too numerous to be mentioned here, but their names will crop up in this literature review and elsewhere. One person who has contributed to a fuller understanding of the OA movement is Peter Suber through his

²⁰ <http://miracle.si.umich.edu/bibliography.html>

²¹ <http://openaccess.eprints.org/>

²² <http://amsci-forum.amsci.org/archives/American-Scientist-Open-Access-Forum.html>

chronicling of the OA movement through his blog²³, timeline (Suber, 2007), guide (Suber, 2004) and overview (Suber, 2006). Another whose work provides insight in scholarly publishing more broadly, with sections on New Publishing Models and Repositories, E-Prints, and OAI, is Charles Bailey through his *Scholarly Electronic Publishing Bibliography (SEPB)* (Bailey, 1996-2006), his *OA Bibliography* (Bailey, 2005-2008) and his jointly authored *OA Webliography* (Ho & Bailey, 2005).

Supporters of OA have formed organisations and societies to further the OA message and support OA initiatives. Examples vary from those that work in advocacy such as the Scholarly Publishing and Academic Resources Coalition (SPARC), to those that effect change such as Sponsoring Consortium for Open Access Publishing in Particle Physics (SCOAP3). In 1998, SPARC²⁴ was formed in the USA as an international alliance of academic and research libraries working to correct imbalances in the scholarly publishing system. It was later joined by SPARC Europe²⁵. This is a library-backed advocacy group that publishes guides for achieving OA, recruits and provides speakers for conferences on OA and produces other OA advocacy materials. One example is “Open Doors and Open Minds: What Faculty Authors can do to Ensure Access to their Work Through an Institution” (Nguyen, 2008). CERN's (European Organisation for Nuclear Research) SCOAP3 project works to change the publishing business model, in which all of the partners that support publishing in particle physics, including libraries, are being asked to redirect subscription monies into a common fund that will pay publishers for OA to particle physics research²⁶. Another organisation promoting OA is Creative Commons which creates and provides “free tools that let authors, scientists, artists, and educators easily mark their creative work with the freedoms they want it to carry”²⁷.

Some writers advocate mandatory OA archiving (Harnad, 2006; Sale, 2006a; Sale, 2006b). Not just OA benefits, but further benefits to institutions would accrue, such as keeping track of research output, and research reporting, as well as eventual online global access to all research. Benefits to researchers include increased readership and citations, and therefore higher research impact (Harnad, 2003). This is already seen in IR implementations. Sale (2006b) has analysed the impact of mandatory policies on both electronic thesis and other IR

²³ <http://www.earlham.edu/~peters/fos/fosblog.html>

²⁴ <http://www.arl.org/sparc/>

²⁵ <http://www.sparceurope.org/>

²⁶ <http://www.scoap3.org/>

²⁷ <http://creativecommons.org/>

content (Sale, 2006a). While the greatest participation and growth in content comes from those institutions which have a mandatory deposit policy, it is acknowledged that mandating alone is probably not successful. Callan (2005) from the Queensland University of Technology which has an established institutional repository with a mandatory deposit policy²⁸ reported that:

It was only when we identified and lowered the barriers to participation that our academics started depositing their own papers. That is, we (the Library) relieved them of the burden of responsibility for checking the publisher's policy on self-archiving and allowed them to upload the file in any format (including MS Word).... Once the perceived benefits outweighed the perceived difficulties and worries, the floodgates were opened.

Callan's comments and her later publications (Callan, 2004; Callan, 2007; Cochrane & Callan, 2007) appear to indicate that it is not the mandatory policy alone, but also behavioural, social and other factors, or it could be the presence of particular actors in the network enrolling new actors, that contribute to IR success in attracting content and commitment. More research on this is warranted.

2.5.3 WORDS OF CAUTION AND THE PUBLISHERS PERSPECTIVE

There is opposition to IR and other forms of OA from commercial journal publishers who see that OA might harm their business and therefore, decrease profits. There is further opposition from some of the scientific societies for whom sale of publications can form a significant part of income and subsidise their other activities (Goodman, 2004; Poynder, 2004).

However, Oppenheim (2008: p.587) cautions that while "... it may be intuitively reasonable to assume that the move by authors to self-archive will reduce the profits of publishers ... as yet there is no clear evidence of such an impact". None-the-less active resistance to OA has come from some publishers. It intensified with the increasing roll out of mandates. In 2007 scientific, technical and medical (STM) publishers even forged an alliance called PRISM²⁹ (Partnership for Research Integrity in Science and Medicine) to work against OA, particularly OA mandates (Giles, 2007; Van Orsdel & Born, 2008). The initiative, however, backfired in some ways as several influential publishers distanced themselves from the alliance.

Before the US National Institutes of Health (NIH) mandate was even operational, statements from publishers condemned it, claiming that among other things it takes away their intellectual

²⁸ http://www.mopp.qut.edu.au/F/F_01_03.jsp

²⁹ <http://www.prismcoalition.org/>

property rights without compensation and threatens peer review. The NIH Guidelines present a different reality ensuring that Copyright law is adhered to, and that what is required to be deposited is the author's final copy of the peer reviewed manuscript which may be embargoed for up to twelve months to protect the publishers' investment (Van Orsdel & Born, 2008).

Morris from the Association of Learned and Professional Society Publishers (ALPSP) counsels publishers that change is inevitable and resistance futile. Repositories and OA are only the beginning of changes enabled by technologies. It is vital, in her mind, for publishers to seek understanding and collaborations to find a way for themselves in the future (Morris, 2007).

2.5.4 RESEARCH ON OPEN ACCESS AND INSTITUTIONAL REPOSITORIES

Nevertheless, the debate continues about whether repositories will reduce journal subscriptions. Ware (2006) conducted a survey of librarians asking them how they make journal cancellation decisions. Proportionally so few scholarly journal subscriptions are held by individuals, that it is the cancelling of journals by libraries which will have an effect on publishers. Repositories are not seen by the respondents as substitutes for journals, especially as many librarians are not aware of the content overlap that may or may not, exist between their repositories and journals nor are they prepared to develop software to test it. Three times as many of Ware's respondents thought that there would be no impact on holdings as those that thought there would be an impact. In contradiction, 53% thought that availability via OA archives is an important factor in determining cancellations. Thus, the situation is far from clear. Ware does not disclose whether this survey addressed the issue of quality control or peer review at all. Perhaps the answers would have been different if the scenarios had included one with repositories alone, without the input of certification and registration from the journal?

There are many surveys and other studies on OA and IR. Some focus on the spread of OA and IR and others focus on authors, and their publishing behaviour related to OA and IR. Of the studies which focus on the spread of OA IR, most find that increasingly universities are implementing them. A survey conducted in early 2005 with responses from 97 of the 124 (78.2%) individual higher education institutions in the USA who form the Coalition for Networked Information's members in the USA found 40% of universities and 6% of colleges had operational IR. 88% of the universities and 21% of the colleges that did not were planning to (Lynch & Lippincott, 2005). A multi-country study conducted later in that year found variability in the percentage of universities with IR from 1.5 (Finland) to 100% in Germany.

However, doubts about the accuracy of the survey results are raised with the claim that 37 of Australia's 39 had IR (Van Westrienen & Lynch, 2005). This has occurred because the survey did not distinguish between digital thesis-only repositories and IR, and the statistics were generally for averages across the country, thus the picture painted was somewhat optimistic. Despite these discrepancies this study does indicate that IR are becoming a growing and increasingly important part of university infrastructure and except for the USA and Australia the focus of most does seem to be OA to faculty publications. More recently, in the USA a study sampled the registry of Open Access Repositories (ROAR) and repository developer e-lists and wikis and conducted Google searches for the period November 1, 2005 through March 2, 2007. The number of repositories found came to a peak in March 2006, when the number of repositories counted rose to 91 after which there was some closing down of repositories and some consortia (shared) repository development (McDowell, 2007). A later survey shows that by 2008 32 Australian universities have active repositories, of which 31 are openly accessible. Three more institutions are planning to launch later in 2008, and two indicate they have plans to launch in 2009, and the closed access repository is planning to OA to items in 2009. Thus of the 38 Australian universities, 37 should have repositories by end of 2009 (Kennan & Kingsley, 2008). The study by McDowell (2007) in the US also looked at repository content and found that growth in this area was very slow. In her words, based on her study "institutional repositories in America will likely not achieve the critical mass to significantly impact OA or change modes of scholarly communication for some time to come. "

The reasons researchers are so loathe to place their work in repositories have prompted a plethora of studies. Most of them are based on surveys, some on interviews (Swan & Brown, 1999; Houghton et al., 2003; Rowlands & Nicholas, 2005; Swan & Brown, 2005; Rowlands & Nicholas, 2006; Hess et al., 2007; Kennan, 2007; Mann et al., 2008). In these studies most scholarly authors state their motivations for publishing as communication with peers, enhancing career prospects, building their *Curriculum Vitae*, and gaining prestige and funding for future work. Researchers acknowledge they generally do not receive direct payment, or direct benefits, from actual ownership of their work. The reward structure is instead promotion, tenure, better employment and research opportunities which arise from acknowledgement that they produced the work. While respondents were knowledgeable about their traditional publishing, because it is so tied in with the nature of their work, many of them expressed a lack of knowledge or understanding about OA or their own institution's repository. Only small percentages of researchers had deposited in repositories or published

in OA journals. Many believed it would adversely affect their promotion and tenure opportunities to publish in OA journals (which were perceived to have lower impact), or that to deposit in repositories would jeopardise their copyright agreements with publishers. However, substantial percentages in two of the surveys reported they would comply if their institution mandated deposit in its repository (Swan & Brown, 2005; Kennan, 2007). Another study (Hess et al., 2007; Mann et al., 2008) interestingly used the Technology Acceptance Model as the basis of its survey but appears to conflate questions about green and gold OA by talking about “OA publishing”. A more recent survey conducted in Australia (Austin et al., 2008) focused on copyright and found that while a high proportion of academics were in favour of OA and granting their institution a non-exclusive licence to place their work in an OA IR substantial numbers reported they didn’t do so because of lack of awareness about suitable repositories and concerns about their copyright position with regard to journals. The results would indicate that institutions should supply more information about OA, their repositories and copyright. These studies often focus on what researchers want to achieve with their publishing and find similar results - communication of their findings, recognition of their work, promotion and tenure. Similarly their concerns with OA IR depositing are generally speaking lack of interest or time, and issues with copyright and plagiarism. These studies often provide strategies for repository managers to make their repositories more attractive for researchers to deposit in. These strategies are communication of the potential OA citation advantage; making deposit easy, simple and fast; instituting a mandate for deposit, tying IR deposit in with other research reporting and so on.

One study in particular studied faculty (researchers) work practices, their research and their perceptions of IR (Foster & Gibbons, 2005). They found that most researchers were overworked and resented any activity that cuts into their research and writing time. They were all familiar with using electronic resources and they had a long list of requirements. However their key requirements were that work placed in an IR be safe and secure, and that it be findable and citable. The study proposes strategies to meet researchers’ needs and overcome their misperceptions about OA IR. Their strategies were two pronged: approach researchers on their own ground; and make the technology easier for depositing and better able to showcase a researchers’ work. Other projects are underway to look at motivational and support issues

such as the “Rights and rewards in blended institutional repositories” project (Oppenheim, 2005) based at Loughborough University and other JISC³⁰ projects.

Kim (2007) brings this work together and forms a conceptual model of the factors proposed based on the Socio-Technical Network Model and Social Exchange Theory. A preliminary survey (31 respondents) was conducted based on a sample of 67 professors whose materials were deposited in the DSpace IR of a major research university. The findings indicate that faculty members who planned to contribute to the IR in the future agreed more strongly with of the concept of OA and possess a greater altruism in making their work publicly accessible. Some faculty members indicated they were waiting to see whether their grant-awarding bodies would require them to self-archive before making a decision to contribute to the IR (Kim, 2007).

Further studies have analysed the users of scholarly research, but those found looked at scholarly publishing in general rather specifically at users of OA works from IR. Houghton et al. (2003) summarises the literature on user studies and find that many academic researchers utilise the full range of information resources, but that there is a “disciplinary divide” similar to the “digital divide”. Other studies have focussed on how people use electronic resources or on their feelings about electronic and print resources in the library. Tenopir (2003) summarised and analysed 200 research publications looking at how users interact with or feel about using electronic resources and found among other things that: electronic resources are perceived as convenient, relevant and time saving; different disciplines have different requirements; print is still important in all disciplines, but particularly in the humanities; print still the preferred option for books; most electronic information users still print out for reading; searching by topic is important; and most journal article readings come from articles in their first year of publication, although a sizable minority are older. Concerns were raised regarding electronic collections included that they may not be complete or long lived. The use of electronic journals increases every year, often accompanied by decreasing visits to the physical library. More recently Tenopir and colleagues have been surveying academic staff about their journal reading behaviour (Tenopir et al., 2005). While largely consistent with her earlier reported work a number of interesting results are reported including use of author’s web sites and

³⁰ “The Joint Information Systems Committee (JISC) supports further and higher education by providing strategic guidance, advice and opportunities to use Information and Communications Technology (ICT) to support teaching, learning, research and administration. JISC is funded by all the UK post-16 and higher education funding councils.” <http://www.jisc.ac.uk/>

various kinds of online repositories. No studies seem to have focused on the users of OA and IR. Most were like Tenopir's studies; focusing on journal use generally.

Related research has been conducted into ways of evaluating repositories. Some studies have examined the major repository projects in Europe and North America and analysed their overall lack of success in attracting content despite seemingly overwhelming views in favour of the idea of IR (Mark Ware Consulting Ltd, 2004; Davis & Connolly, 2007). Other studies caution against the approach of using only content or the number of deposits and use for evaluation, suggesting instead that sustained deposits consistent with reasonable expectations of the community's output as a more acceptable evaluative measure (Carr & Brody, 2007). Xia and Sun (2007) propose indicators for success including information about the depositor, and that information about deposits by discipline, faculty, and version (e.g. preprints and post-prints), type (journal, conference or working paper) might be more appropriate, but many of the measures they propose are currently difficult to measure (Carr & Brody, 2007).

Thus we see repository implementations are on the increase but repository deposits are not progressing at a related pace. One very recent study using a random sample of articles tried to estimate the proportion of articles which are available as copies deposited in repositories or as other green OA, and found only 11.3% (Björk et al., 2008).

2.5.5 TECHNOLOGICAL DEVELOPMENT AND RESEARCH

Research into OA is complemented by practical (design) research that produces standards and strategies, repository software and services, developer literature and so on. There is a plethora of work, not all of which can be included here but some examples follow.

The Open Archives Initiative³¹ (OAI) develops and promotes interoperability standards that aim to facilitate the efficient dissemination of content. The OAI's Protocol for Metadata Harvesting (OAI-PMH) was created to facilitate harvesting of distributed resources. It is "a simple, yet powerful framework for metadata harvesting. Harvesters can incrementally gather records contained in OAI-PMH repositories and use them to create services covering the content of several repositories" (Van de Sompel et al., 2003). OAI-PMH could be used, for example, to provide federated searching, to enable papers deposited in IR to have their metadata exposed and be harvested by other repositories, for example disciplinary or subject

³¹ <http://www.openarchives.org/>

repositories (Pinfield, 2005). OAI-PMH allows service providers to make available more than just search services such as citation analysis. Citebase³² provides an early example of this.

In the UK the Joint Information Systems Committee (JISC) funds many projects related to OA and IR such as SHERPA: Securing a Hybrid Environment for Research Preservation and Access³³. This is designed to develop IR in universities to facilitate the rapid and efficient worldwide dissemination of research. SHERPA in turn develops advocacy materials and materials that assist in the promulgation of OA and IR. One well known service is SHERPA RoMEO³⁴ which provides a database of publisher and journal copyright policies which authors and repository managers can check prior to depositing works. The OAKLaw project in Australia, based at the Queensland University of Technology, is developing legal protocols for managing copyright issues in an OA environment³⁵. At a technical level it will investigate provision and implementation of a rights expression language. The project has also developed the OAKlist³⁶ a web-enabled database containing information about publishing agreements and publishers' OA policies to be used in conjunction with SHERPA RoMEO.

Software has been developed that contributes to the spread of OA. For example Willinsky (2006) has collaborated with others on this through the Public Knowledge Project which is a research and development initiative involved in developing open source, freely available software for the OA publishing of journals and conferences and for harvesting from open archive³⁷.

The University of Southampton in the UK has been very active in this area, developing the EPrints software³⁸, the Register of Open Access Repositories (ROAR)³⁹, and the Registry of Open Access Repository Material Archiving Policies (ROARMAP)⁴⁰. Other repository software developments include Fedora (Payette & Lagoze, 1998; Payette et al., 1999; Van de Sompel et

³² <http://www.citebase.org>

³³ <http://www.sherpa.ac.uk/index.html>

³⁴ <http://www.sherpa.ac.uk/romeo/>

³⁵ <http://www.oaklaw.qut.edu.au/about>

³⁶ <http://www.oaklist.qut.edu.au/>

³⁷ <http://pkp.sfu.ca/>

³⁸ <http://www.eprints.org/software/>

³⁹ <http://roar.eprints.org/>

⁴⁰ <http://www.eprints.org/openaccess/policysignup/>

al., 2004b) and DSpace which arises out of a joint project by a university (MIT) and software vendors (Smith et al., 2003).

2.5.6 LITERATURE ON THE IMPACT OF OPEN ACCESS

Why might researchers make their work OA? In addition to believing in the OA mission perhaps OA may also be of benefit to authors? How might OA benefit authors? One important factor for all authors is impact, typically measured by the number of times a paper is cited. Research, often comprising citation analysis⁴¹ has been conducted to answer the question: Do articles that are freely available online have a greater research impact? “Access is not a sufficient condition for citation, but it is a necessary one” (Harnad & Brody, 2004). Before discussing citations in OA it is important that the assumptions inherent in the use of citation analysis are acknowledged: that a citation implies use; that it is based on merit and not on criticism; that it reflects similarity of content; and that all citations are equal (Pierce, 1990). Problems with citation analysis are numerous. Issues include: many researchers do not cite sources fully or equally; that citation is often to secondary sources (such as literature reviews) rather than the original work; self citations proliferate, and that citation often represents social factors such as the communities to which scholars belong and the publication formats preferred by a discipline (Pierce, 1990; Wilson, 1999; Cameron, 2005). Garfield (2005) also cautions the need to distinguish between readership and downloading and actual citations, but acknowledges that web use may be a harbinger of future citation. None-the-less citation analysis is one tool used to increase understanding of scholarly communication.

OA dramatically increases the number of potential users, by providing access to users who individually or institutionally do not subscribe to the journal in which the article appears. The debate was sparked in *Nature* in 2001. In this paper Lawrence (2001) analysed 119,924 conference articles in computer science and related disciplines and found that the mean number of citations to offline (printed) articles is .274 and those online is 7.03. Antelman (2004) examined the mean citation rates as recorded in the *ISI Web of Science* for freely available articles with those that are not for a sample population of journals in four disciplines (without addressing publisher policies or author reasons for posting or not). She found that open-access articles have a greater research impact than articles that are not freely available. Not all articles in the impact of OA on citations and use report the same findings; however that

⁴¹ Citation analysis is an aspect of bibliometrics which is a technique which counts and interprets data gathered from and about publications (Wilson 1999). It is used for a number of purposes including the calculation of impact factors for journals and articles.

is possibly because they are measuring slightly different things. For example, OA journals are studied in one case and non-OA or print and online journals in another (Anderson et al., 2001; Testa & McVeigh, 2004). Better would be to compare OA articles with non-OA articles from the same journal which would control for journal quality variables. A growing number of journals are giving the “green light” to author self archiving and one suspects that this is partially because journal impact factors benefit from increased article impact factors (Harnad et al., 2004).

Work on this aspect of OA continues and the Open Citation Project (Open Citation Project, 2008) continues to describe progress by reporting and linking to the increasing number of these studies; it also lists the Web tools available to measure impact.

2.5.7 THEORETICAL PERSPECTIVES

While there has been much discussion in the literature of the pros and cons of IR, there has been little work framing them within a theoretical context. Some feel the introduction of IR and the consequent easy access to scholarly publications will cause the cancellation of subscriptions to journals published by learned societies and commercial publishers and therefore force changes in the whole scholarly publishing paradigm, not just in the ways that people access information. In the words of Oppenheim (2005) “it seems ‘obvious’ to many that the increased use of OA will lead to journal cancellations...An alternative view is that there is no cause and effect relationship between OA and cancellations”. Neither suggestion is supported or refuted by research. IR may also influence change in other newer aspects of scholarly information such as digital theses repositories (Lafferty & Edwards, 2004; Lafferty, 2005). Lafferty and Edwards argue that any of these scenarios are possible and that self archiving in open archives and IR may therefore play the role of a disruptive technology based on Christiansen’s theory of disruptive technologies which predicts that existing organisations and industries can be made obsolete (or sustained) by changes in the paradigm within which they operate (Bower & Christensen, 1995; Christensen, 1997; Adner, 2002; Christensen & Raynor, 2003; Christensen, 2006).

Other authors on OA and IR refer explicitly to Christensen’s theory (Lewis, 2004; Look, 2004; Madison, 2006). Well-established publishers and library customers focus on refining the current options: for example, by turning paper journals into electronic journals, by creating new economic models for access such as bundling, and by making improvements to products, such as improving user interfaces and ease of use. In the meantime new options, such as

institutional and disciplinary repositories are ignored, or relegated to the margins. Look (2004) suggests that publishers who underestimate or actively oppose the OA movement may end up mortally injured. This theoretical approach suggests avoiding comparisons with old technology, which will nearly always look better (for many reasons including; the old is familiar, change can be disruptive and unsettling), but instead study the trajectory of the new technology as the application of new technologies introduce different characteristics from the ones customers have historically valued. The difficulty with this approach is that it looks at the issue from a market or industry perspective, whereas perhaps we need to focus more deeply on the individual researchers and technological actors?

There is some research looking at scholarly publishing framed within the theoretical perspective of social informatics for example (Kling & Covi, 1996; Kling & McKim, 1999; Kling & McKim, 2000; Kling & Callahan, 2003; Kling et al., 2003; Park, 2008) but I could find none specifically focusing on OA and IR. Bohlin (2004) examines arXiv, the physics disciplinary repository through the lens of the Social Construction of Technology (SCOT) approach. He sees the disciplinary repository arXiv and traditional scholarly publishing as competing science communication regimes. He contests the inevitability that OA disciplinary repositories will become mainstream using the concept of interpretive flexibility. However, at the end of his article he proposes that the reshaping is still occurring and the future is uncertain. Other authors (Williams & Lawton, 2005; Park, 2008) propose examining the current changes occurring in scholarly publishing, OA and more specifically IR using a social-technical or socio-material approach. With these authors I believe this approach could offer a more in depth understanding of scholarly publishing, OA and IR by studying them as socio-technical or socio-material systems (that is complex systems comprising of people, technologies and other material things). Arguments supporting this statement will be presented in the following Chapter.

2.6 CHAPTER CONCLUSIONS

Costs of journals and other works for libraries have risen, and costs of technology, particularly electronic networking, have dropped. Advances in technology have meant that most research output is in electronic format, in both its published and pre-published forms. Scholarly work needs to be communicated, used and developed. There is a growing body of opinion that these factors would be best served by the establishment of OA IR. In addition to the technical and scholarly reasons, there are also arguments that OA also serves ethical and social justice

purposes. For example, the public, through government funding, supports research and should therefore have access to it. Also, OA will make scholars' work more readily available to developing countries and the researchers, organisations and individuals in them, who may not otherwise have access to journals priced according to western economic models (Drott, 2006).

There is debate and discussion about what may or may not be the best way to move forward. As Jim Gray (quoted in Borgman 2007: p. 3) says "May all your problems be technical" reminding us that building a technical infrastructure for scholarly publishing, IR and OA may be "easier than understanding what to build, for whom, for what purposes, and how their usages of the technologies will evolve over time" (Borgman 2007: p. 3). As Borgman and many others have noted, people adapt technologies to suit their practices, often in ways unintended by designers and developers.

Broadly, this research aims to look at change in scholarly publishing and at one area of change in particular. The phenomenon to be studied is OA for scholarly publishing, specifically what is termed green OA, where copies of researchers' works are self-archived in IR. Green OA appears to offer multiple advantages for researchers and their institutions, many universities are implementing IR and yet deposit and use by researchers themselves is low. Even where IR are implemented, it seems researchers are slow to take them up, despite the congruence of green OA with the aims of research and scholarship, the increasing implementation of IR and the potential citation impact for authors who make their work OA. Thus my broad research aims to investigate the roles of OA and IR in scholarly publishing.

The next Chapter will introduce the theoretical approach selected to investigate this issue, the rationale behind its choice and the specific research questions.

CHAPTER 3

3 THEORETICAL APPROACH

In the Introduction and the Literature Review I demonstrate that OA and IR are producing change in scholarly publishing. Some propose that this change may be profound (National Research Council. Panel on the Impact of Information Technology on the Future of the Research University, 2002; Björk, 2004; Davidson, 2005; Rowlands & Nicholas, 2005; Rowlands & Nicholas, 2006). Benefits for both researchers and society are proposed by some actors but challenged by others. As an agent of change the loose alliance called the OA movement is gaining momentum; institutional and disciplinary repositories proliferate. But precisely how the change is occurring is unclear and where it will lead is uncertain. Therefore I seek an approach that will promote understanding of the emergent, dynamic nature of the socio-material world of OA and IR.

Social theory has been defined in many ways. Put most simply, theory is a “...system of interconnected ideas that condenses and organizes knowledge about the social world” (Neuman, 2003). Gregor (2006) counsels that the research approach adopted varies with the different type of theory adopted and that different types of theory exist and are used in IS, and that all can have valuable contributions to make. As Weick (1995) suggests, when utilising or putting forward a theory it is important to place it in the “context of what came before and what comes next” (p. 389).

This chapter begins by briefly describing the ongoing theoretical discourse of the information disciplines. I then describe a relatively new theoretical approach, actor-network theory, and explain why I have chosen it to help understand scholarly publishing, OA and institutional repositories. Finally, from the material in the literature review and in this chapter, the research questions are framed. The “what comes next” will be developed in the following chapters.

3.1 FOUNDATIONS

3.1.1 BACKGROUND

In the academic context, research is a systematic and intensive study designed to increase understanding and scientific knowledge (Nunamaker et al., 1991; Leedy & Ormrod, 2005). The nature of the exploration might be to test a hypothesis, to develop a theory or model, to

evaluate a theory or model, or to investigate a specific research question. The unit of analysis may be the organisation, a group, the individual, inter-organisational relations, and so on. Different methods may be used such as experimentation, survey, case, action, participant observation etc. Different techniques may be used to collect data to inform the research, such as surveys, questionnaires, observation, or documents; and different tools are employed to analyse the collected data (Hoyle et al., 2002; Leedy & Ormrod, 2005). There is no universal understanding of terminology in information systems (IS) nor is there a shared theoretical basis (Orlikowski & Baroudi, 1991; Mingers, 2001).

Research in information systems (IS) uses a multiplicity of approaches, and can encompass a wide variety of areas. This is because information systems are more than technology, encompassing also organisations, individuals, management, business and values. IS research, therefore, has to draw on a wide range of disciplines – “technology, psychology, economics, sociology, mathematics, linguistics, semiotics” and it therefore also draws on a wide range of research paradigms, methods, and approaches that inform those related disciplines (Mingers 2001). The research approach selected by researchers defines the orientation of the study and affects the research design, results and interpretation (Prescott & Conger, 1995; Neuman, 2003). The appropriate selection of a research approach will depend on the combination of the discipline influences, the question(s) addressed and the interests of the researcher. Further, each approach sits upon its own set of philosophical assumptions and principles, and has its own stance on the “correct” way to perform research (Neuman, 2003).

Broadly speaking in information systems and organisation studies, research has been seen through the eyes of Burrell and Morgan (1979) with further elaboration by Deetz, (1996) and Gole & Hirschheim (2000). Underlying Burrell and Morgan’s work is the proposition that, consciously or unconsciously, researchers base their work on a series of assumptions which place research in either subjectivist or objectivist dimensions. These assumptions about ontology, epistemology and human values and nature are proposed to have methodological consequences. The assumptions in Burrell and Morgan’s work inform four distinct paradigms: functionalist (positivist), interpretive, radical humanist and radical structuralist. More commonly in information systems the paradigms are referred to as positivist, interpretive and critical (Orlikowski & Baroudi, 1991).

3.1.2 DOMINANT APPROACHES IN INFORMATION SYSTEMS RESEARCH

Positivist research is the dominant paradigm in IS (Orlikowski & Baroudi, 1991). It is sometimes called traditional or experimental research, or research with a quantitative, deductive approach and is used to answer questions about relationships among measurable variables with the purpose of explaining, predicting and controlling phenomena. It is based on the belief that social-science research should be conducted in the same way as research in the natural sciences (Lee, 1999). Interpretive research is used to develop an understanding of social life and to study complex phenomena. It is more likely to describe and try to understand the phenomena from the participant's point of view and always involves interpretation by both researchers and actors (Nandhakumar & Jones, 1997). A critical approach or critical social science is a newer approach, which advances a humanist perspective of IS, and argues that social research must be both reflexive and political (Neuman, 2003; Cecez-Kecmanovic, 2001). Unlike positivist and interpretive research, critical social science does not consider explanation, description or understanding sufficient, but aims to address social concerns such as domination, control and emancipation, and change (Cecez-Kecmanovic, 2001; Brooke, 2002), and to critique and transform the social order (Klein & Myers, 1999; Cecez-Kecmanovic, 2005). It has a more liberatory and emancipatory purpose.

Positivist research operates on the objectivist assumption that an ordered reality is out there waiting to be discovered, and that our knowledge about this reality is stable and additive. Further, positivism assumes that statements about reality are true only if they are repeatedly not empirically falsified and that human beings are self interested, rational, pleasure seeking individuals influenced by the same external reality which has the same effect on everyone based on causal laws which are probabilistic. "A statement in positivist sciences is true if and only if it describes reality as it is, if proposition and reality correspond. The preferred method of arriving at true statement is that of empirical investigation" (Stahl, 2003 p.2879). Conflict is seen as a symptom of a problem which can be resolved. For positivists, science and scientific knowledge is better than, and will eventually replace, other ways of gaining knowledge, such as common sense, which is seen as the antithesis of science; logically inconsistent, unsystematic and biased (Neuman, 2003). Theories in positivism are considered to state general causal laws that operate according to strict and logical reasoning (Burrell and Morgan, 1979). For positivists, the truth can be detected by applying reason. Explanations must have no logical contradictions, must be consistent with observed facts and be replicable (Lee 1999). Positivism assumes that facts are different from ideas, values, theories or thoughts, and

knowledge gained from observable reality is superior to other knowledge. Rational people who independently observe facts share a subjective understanding of those facts; there is a single right way of seeing the world (Orlikowski & Baroudi, 1991; Stahl, 2003). Most importantly positivists believe in objective, value free science which operates separately from social and cultural forces. Ideally positivist researchers should be detached from the topic of study, accumulating value free facts (Nandhakumar & Jones, 1997; Brooke, 2002). Methodology is developed to support the underlying assumptions of the approach. Scientific methods such as experiments and surveys are favoured. Rules and norms influence research design from empirical data collection, statistical data analysis, and display of findings with an emphasis on accuracy and precision (Neuman, 2003; Cecez-Kecmanovic, 2005).

The assumptions behind interpretive research include the view of the social world as an intentionally created, fluid and fragile entity which exists as people experience it and people thus give it meaning (Nandhakumar & Jones, 1997). Interpretive research adopts the position that knowledge of reality is socially constructed (Walsham, 1995a). People (including researchers) may or may not experience reality in the same way, so that multiple interpretations of reality (individual and organisational life worlds) are possible (Neuman, 2003). Interpretive researchers assume that people are social beings who create and find meaning through social interaction, through which they interpret the social world and make sense of their lives (Walsham, 1995b; Schwandt, 2000). Additionally reality and the individual that observes it cannot be separated. Each person, including the researcher, constructs his or her own reality (Walsham, 1995b). Interpretive researchers have a view that it is critical to understand common sense because people use it to guide daily living, and it is the researchers' role to describe not to judge (Neuman, 2003). Theory for interpretive research tells a story by describing and interpreting through rich descriptions a particular social world, in its own context. For interpretive researchers an explanation needs to make sense to those being studied as well as to the researchers and aims to convey a deep understanding of how the way those being studied reason, feel and think. In interpretive research facts, or evidence, are fluid and embedded in the context of the research, they cannot be neutral, impartial or objective (Neuman, 2003). Interpretive researchers include as much evidence about the subject and about their research process and context to enable others to understand how they came to their conclusions (Walsham, 1995b; Walsham, 1995a; Neuman, 2003). "The mere decision to do empirical research is a value choice and researchers consequently cannot be neutral observers" (Stahl 2003). Interpretive and critical (non-positivist) researchers argue that

researchers are inherently implicated in their research. Interpretive research questions the possibility of being value free for either researchers or actors, and sees values and meaning as a part of everything (Walsham, 1995b; Cecez-Kecmanovic, 2005). However, interpretive researchers do not judge one set of values as better than another. Critical research takes this one step further by seeing social research as a moral and political activity that requires the researcher to commit to a value position. Methodologically interpretive research is situated in the setting it examines and thus tends to use approaches such as field and case studies, action research and discourse analysis. Findings are viewed as interpretations with evidence focussing on the authenticity of the research process and explicit detailing of the way in which the empirical material is collected and analysed (Neuman, 2003; Cecez-Kecmanovic, 2005)

Critical IS research aims to bridge the subjective/objective poles of the positivist and interpretivist approaches. It assumes that social and material realities do exist independent of human consciousness and human subjective perceptions and experience, but that consciousness, perceptions and experience are reflections upon and products of reality (Cecez-Kecmanovic, 2005). Critical researchers assume that reality is out there, but it is a socially constructed reality constantly changing with social, political and other forces which exist in multiple layers often in conflict and full of more or less hidden power relationships. Critical researchers see people as creative, changeable and adaptive, who can be misled and exploited. Critical research aims to give people the information to dispel their illusions and join collectively to change society or organisations for the better. While accepting that researchers should study common sense, critical researchers assume that it is based on a sense of false consciousness and therefore needs to be studied and exposed (Neuman, 2003). Critical researchers derive theory from critical social theories which foster reflexivity, take issue with instrumental rationality and technological determinism and expose ideology and vested interests (Cecez-Kecmanovic, 2005). Critical researchers describe relevant underlying material and historical conditions and cultural context to encourage participatory and emancipatory change. Critical researchers develop explanations and theory and continually test and modify those explanations until they become good enough to supply people with tools to change the world (Neuman, 2003). The critical approach bridges the two stances of positivism and interpretivism by accepting that some facts of material conditions exist independent of subjective perceptions, but that they require interpretation, which each person will perform differently through an understanding of history, and an adoption of values (Cecez-Kecmanovic, 2001). Methodologically, critical IS research is still developing its methods, but learns from

critical ethnography, participatory action research and discourse analysis, often grounded in critical hermeneutics (Cecez-Kecmanovic, 2005).

Orlikowski and Baroudi (1991) argue that the use of these different approaches, with their different assumptions and methodologies, allows the exploration of phenomena from diverse frames of reference and therefore should be encouraged to provide a richer understanding of the issues under study. The continuing separate use of these different approaches rests on acceptance of the notion of “paradigm incommensurability”. Paradigm incommensurability is one of the pillars of Burrell and Morgan’s (1979) work and refers to the contention that the paradigm, in the case of IS, positivism, interpretivism and critical social science, are mutually exclusive. Further, it is considered that research approaches and methods are bound to particular paradigms and are therefore also incommensurate. Some researchers argue for paradigm integration, but reflect on the drawback that although the paradigms may blur at the edges, they are based on “competing and irreconcilable assumptions”. Others suggest paradigm interplay which acknowledges differences and similarities by encouraging cross-fertilization between paradigms (Goles & Hirschheim, 2000: p. 259-260). Still others consider paradigm incommensurability to be overstated and argue for a pluralist approach. The pluralist approach suggests that researchers do not have to accept existing paradigms but can develop new ones which draw on the strengths and weaknesses of the old ones, but have their own assumptions and concerns (Mingers, 2001). Deetz (1996) argues that the whole nature of the discourse on paradigms in research is too rigid, too strongly grounded in the objective/subjective distinction. Instead he proposes different discourses or orientations, movement across each being desirable but difficult to attain.

There is a further extensive body of literature focusing on the social study of technology that utilises several different approaches that grew from sociology, ethnography and the social studies of science. These approaches began sharing some of the epistemological and ontological assumptions of interpretivism. One example is found in the Social Shaping of Technology approaches (Howcroft et al., 2004), but these approaches to the study of technology grew to develop their ontological views to focus on relationality rather than plurality, performativity rather than interaction or impacts (Suchman, 2007; Orlikowski & Scott, 2008). Rather than focusing on the impacts of technology or the interaction of people and technology, instead these new approaches focus on the relations between the social and the material and how these relations are enacted in practice. While originating with sociology

and science and technology studies (STS) this research stream increasingly interacts with the information systems community. One of these approaches is Actor-Network Theory (ANT).

3.1.3 ACTOR NETWORK THEORY AND AFTER

Law (2004) suggests that traditional approaches such as positivism and interpretivism are extremely good at what they do, but that they are “badly adapted to the study of the ephemeral, the indefinite and the irregular” (p.4). He suggests researchers consider approaches which have a “broader or more generous” sense of method. ANT derives from work in sociology specifically in social and technology studies, in particular the work of Callon, Latour and Law (Callon & Latour, 1981; Callon, 1986; Latour & Woolgar, 1986; Latour, 1987; Law & Callon, 1992; Latour, 1995; Callon, 1997; Latour, 1999; de Laet & Mol, 2000; Callon, 2002; Law, 2002; Law & Mol, 2002; Law, 2003; Law, 2004; Latour, 2005; Moser & Law, 2006) and its cousins “After ANT” (Mol & Law, 1994; Latour, 1999; Law, 1999; Law & Mol, 2002), and other socio-material approaches. ANT has many strands and has been used in conjunction with concepts from other theories and schools of thought. Researchers, from ANT’s founders to more recent exponents, have revised, extended and developed ANT (Walsham, 1997; McGrath, 2002). For simplicity’s sake we refer to these strands here as ANT, but recognize that while they share many characteristics there are also differences.

ANT does not fit neatly into either positivist, critical nor interpretive approaches. Indeed it does not comfortably sit with the notion of paradigmatic incommensurability. Braa and Vidgen (1999) posit that:

at the meta level there is the potential of making a reconciliation [between positivism and interpretivism] through ANT, which provides a basis for making sense of both in-context and theoretical research, since all research is concerned with spreading claims, objects, and facts through time and space (p.44)

While it has often been associated with an interpretivist epistemology (Walsham 2006) and used as an interpretive lens, like positivism it can also pay attention to the world outside (Law, 2004; Latour, 2005). ANT proponents believe that there is something “out there” to be found if one follows the actors and the networks (Law, 2004), although it doesn’t seek to provide explanations based on social theories and generalizations. It rejects the positivist assumption that there are “definite, limited, and therefore single sets of processes in the world, that the world is a single thing” (Law 2004: p. 163).

Instead ANT posits that researchers and their methods help to generate the complex worlds they report on. And unlike critical research, ANT makes no “theory of the social or even worse

an explanation of what makes society exert pressure on actors ... [Instead] it always was, and this from its inception, a crude method to learn from the actors without imposing on them an *a priori* definition of their world-building capacities" (Latour, 1999: p. 20). Nor is it completely interpretive; while it admits that there is infinite flexibility in interpretation, it does not accept that interpretation is a characteristic of individual human actors reported as multiple points of view taken on the same thing (Latour, 2005: p.244). Instead ANT develops the concept of multiplicity which recognizes that an object may be simultaneously enacted in different ways. This reinforces the "claim that there are many realities rather than just one (Law 2004: p. 162)."

ANT has an ontological foundation of its own. Cordella & Shaikh (2006) argue that ANT considers reality as an emergent, relational phenomenon rather than an outcome of the process of interpretation. Using the ontology of ANT the researcher allows the actors to speak for themselves. This does present problems of operationalisation, which will be discussed later. ANT is not a theory in the sense of a grand social theory It is rather a theory about ways of "doing" or "seeing" social research, "people, machines, ideas" (Law, 2003), or a theory of method. As Latour (2005: p. 142) suggests ANT is "a theory about how to study things...how to let the actors have room to express themselves". ANT does provide the researcher with language and concepts that assist in our study of the socio-material world.

The network is a metaphor for the trace left behind by actors, who establish connections. The network is not of the macro or the micro, the global or the local, but the continuous trail or structure that is related, connected and associated (Law, 2003; Latour, 2005). Networks are "shifting alliances" which can themselves appear as entities. Networks are often converted into inscriptions or devices, sometimes termed "immutable mobiles" and sometimes "black boxes" when composed of a number of simplified networks. The "entry of new actors, desertion of existing actors, or changes in alliances" can cause these to "be opened" or reconsidered (Tatnall and Gilding, 1999). What is not connected is empty, often referred to as "plasma". Thus actors are treated as mediators who render the movement of the social visible. Latour (2005) describes this as the reassembling of the social.

Latour posits that as actors become aligned within a network they bind themselves to a program of action, a script, which now delegates roles and a trajectory to them (Latour, 1996). These scripts can be delegated into machines, technologies other material components, artefacts which become actors "shifting competencies and affordances back and forth between one another and ... human agents" (p. 301). Once delegated, these scripts are

sometimes called inscriptions. Inscriptions can be instruments, computers, policies, for example.

Some ANT researchers (Mol & Law, 1994; Moser & Law, 2006; Alphonse, 2007) find the metaphor of the network less useful in areas of great complexity. They offer alternatives such as regions where objects are clustered together and boundaries are drawn around each cluster. Then there are spaces where neither the boundaries of regions nor relations of networks mark differences, spaces where "... boundaries come and go, allow leakage or disappear altogether, while relations perform themselves without fracture." For these social spaces they suggest the term "fluid" (Mol & Law, 1994: p.643). Here the social and technical, or material, are seen as completely inseparable. The metaphor arises from the image of what happens when two fluids are mixed together – they become indistinguishable. The term "fluid" also adds the notion of movement to a network. It is also suggested that some things hold together as a fluid rather than as a network. For example, the Zimbabwe Bush Pump, acting in an "intractable" setting, functions best when not too rigorously bounded and is adaptable, flexible and responsive, in other words, fluid (de Laet & Mol, 2000).

In general ANT stimulates the researcher to avoid both social and technological determinism by transcending distinctions between material, technical, non-human actors and social, human or organisational actors and to regard social, material and technological processes as a process of network building (Callon, 1986; Tatnall & Gilding, 1999; Howcroft et al., 2004; Latour, 2005). Social actors cannot simply press their wills on inert passive "things"; similarly artefacts cannot force human actors to perform in a specific way (Tatnall and Gilding, 1999; Law, 2003; Latour, 2005). Instead there is "symmetry" between the social and the material as they are inseparable. Actors may thus be human, organisational, technological, other non-human, political, sometimes even inscriptions such as classification schemes (Bowker et al., 1996). Anything that modifies the state of affairs by making a difference is an actor or if it has no figuration, may be called an actant (Latour 2005: p. 71). If an actor makes no difference it is not an actor (Latour, 2005). Later work (Orlikowski & Scott, 2008) questions the ontological separation implied by the terms human and technology (for example) and argues for an ontological relationality "which posits that entities have no inherent properties, but acquire their form and attributes only through relations with others" (p. 21). Moreover this work questions the notion of symmetry and encourages a focus of recognizing mutual constitution.

Actors in the network enrol allies to strengthen the network by negotiations known in ANT parlance as "translation". Callon (1986) defined four "Moments of translation": These are

Problematization, where actors develop and define the problem that needs to be solved and identify other potential or relevant actors; *Interessement* which means interesting other actors and negotiating the terms of their involvement; *Enrolment*, whereby actors accept the roles that have been defined for them during interessement; and finally *Mobilisation* of allies; whereby actors are enrolled and provide active support. Later studies have illustrated that translation does not always involve clear ‘moments’ of translation such as these defined by Callon (Kennan & Cecez-Kecmanovic, 2007) but rather what Law (2004) calls a mess of translations overlapping and occurring with other competing translations from other networks in which an actor is involved, or has the potential of being enrolled.

ANT helps us to avoid hierarchical views of macro and micro, local and global (Underwood, 2001). ANT does not deny there are macro- and micro-actors. Instead it considers all actors as networks; although some may speak for themselves and others may speak for a multitude they have translated (Callon & Latour, 1981). Investigation of phenomena is not a matter of classifying micro- and macro-actors, but of posing the question: “...how does a micro-actor become a macro-actor?” How can men act ‘like one man’” (Callon & Latour, 1981: p.279)? If we consider actors as networks we can use the same tools to study both. Similarly we can use networks to investigate the local and the global. In studying a local network we might realise that elements come from far away; there might be “seepages” between local and global networks (Law & Callon, 1992). But instead of concentrating on bigger or smaller, nearer or further, ANT concentrates its attention on movement and connections and chains of actors and how they link to each other (Latour, 1999; Latour, 2005). Central to ANT is the questioning of how networks are formed and how they change; how the actors in a network bring together other actors to hold the network together, or to change the network or create another one.

An actor can belong in multiple networks simultaneously, performing and behaving differently in various networks depending on their relative position in the each network (Mol & Law, 1994; Law, 1999). Mol and Law (2002: p. 8) word it thus: “we discover that we are living in two or more neighbouring worlds, worlds that overlap and co-exist” and term the phenomenon “multiplicity”. The boundaries of a given network and the relations-links amongst its constitutive entities with their scope of influence are identified with the concept of topology. An actor-network topology is usually described as grouped entities or elements associated and linked to each other via some relations. Like the elements in the network topology, the relations have properties and characteristics through which the elements, as potential actors, can perform or be performed (Law 1999: p. 6-7). But, Law (1999: p. 9) argues it is precisely in

this naming of networks, topology, translation; that researchers have lost the ability to render complex thinking. So the development of ANT has provided us with labels for thinking and describing, but in the application of those labels we may lose complexity.

In his work Law (1999) posits that the very act of naming these concepts in ANT, and then using these names to talk about what we study reduces the study to the “fixity of singularity” (p. 10) by simplifying. He asks then; how do we talk about complexity, appreciate it, and practice it? He suggests that the use of metaphor holds out promise, and cites Marilyn Strathern’s use of the metaphor of “fractal”, more than one, but less than many. To explicate the concept of fractal he explains that ANT could be seen as a fractal. It is not a single thing nor is it “a random heap of bits and pieces” (p.11). Thus he posits that the very notion that the concepts related to ANT chime with me and encourage me to adopt it as an approach for my study also may encourage me to reduce what I find to singularity and simplicities where the interesting complexities are lost. So the challenge is to somehow produce and understandable and interesting thesis that answers some kind of research question without losing the “interestingness” of the complexities that I find.

The methods needed to “capture” complexity may be, in the words of Law and Urry (2004), “unexpected or counter intuitive” (p. 402). Law & Urry (2004) propose that research approaches and their associated methods do not simply describe the world as it is, or as they see it, but as they enact it. That social science is performative. Further they posit that if we can accept that this is true then those undertaking social enquiry can think about the sort of world they want to help enact. This has implications for method. If we accept that method is performative, then we accept that different methods produce the enactment of different realities. Quoting the physicist Heisenberg they state; “What we observe is not nature itself, but nature exposed to our method of questioning” (p.395). Law and Urry propose new methods, new tools for understanding and practicing the complex and the illusive, but they do not explain or elaborate these new methods or tools beyond suggesting that they need to be sensitive to the complex and illusive and more mobile.

ANT has been criticised for many reasons. Chief among them are that it ignores the wider social environment and provides limited analysis of social structures (Walsham, 1997), that it is amoral by considering humans and non-humans “equally”(Walsham, 1997; Jacobs, 2001) and that it anthropomorphizes non-human actors (Whittle & Spicer, 2008). However, ANT is not prescriptive, it asks us to consider human and non-human actors, not necessarily to treat them as the same or equal (Rose et al., 2005). Orlikowski and Scott (2008) posit that ANT does not

account well for the role and influence of the institution in shaping and being shaped by recurrent action. Others argue that while ANT can provide a valuable framework for empirical analysis it cannot provide a critical account (Whittle & Spicer, 2008). These authors argue that ANT is “underpinned by ontological realism, epistemological positivism and political conservatism” (p. 612), Whittle and Spicer (2008) also point out that research in ANT has often utilised Callon’s four stage model of translation in such a way that tests the model rather than as a “sensitizing heuristic”. They further argue that ANT can be managerialist, focusing on victors, marginalizing those excluded from networks.

Similarly, there are methodological difficulties in identifying and tracing actors and actors (Underwood, 1998; Orlikowski & Scott, 2008). As with all methods there are difficulties which must be acknowledged and managed. Methodological issues of ANT that are relevant to this study are discussed in the following Chapter 4: Research Methodology.

3.2 ANT IN INFORMATION SYSTEMS RESEARCH

An editorial in a special issue of the journal *Information Technology and People* focusing on ANT suggests that ANT is a theory inhabiting the social and the technical. It therefore has great potential to contribute to the analysis and understanding socio-technical or socio-material phenomena such as those occurring in the domain of information systems (Hanseth et al., 2004). ANT has generally been adopted by researchers keen to avoid the subject/object, nature/society dualisms (Vidgen & McMaster, 1996) and thus both technological and social determinism. These researchers want to understand technology and information systems in organisations and life in all its rich complexity (Tatnall & Gilding, 1999). This potential for contribution is reflected in the plethora of papers about ANT or using ANT in the IS literature. It is impossible to cover all the work here, however, what follows provides a flavour of the ways in which ANT appears in the IS literature.

Often ANT has been used to provide a conceptual framework, or an analytical lens, particularly utilising Callon’s moments of translation. For example Underwood (2001) investigates how shared meaning was constructed among stakeholders during an information systems development project. Callon’s four moments of translation were found to provide useful explanation for the stages in the project where actors were found to be heterogeneous and included people, activities, concepts, projects and computer programs. The translation moments have been used by many authors in slightly different ways. For example Smithson & Tsiavos (2004) explored how the act and product of IS evaluation can be represented as a

process of translation whereby the proposed IS competes with other organisational programs for allies to make it durable. The evaluation method is itself an inscription that transformed and continues to transform over time.

Other authors use the moments of translation, among other ANT concepts, to suggest how an ANT-informed understanding and utilisation of the concepts of translation could enable practitioners to better anticipate and manage project complexities (Sarker et al., 2006). In other words they propose Callon's translation moments as a framework for practice. Monteiro (2004) points out that much IS research in ANT has focused on how the aims and goals of projects moving through the various steps of translation are often the focus of attention. Some of these types of ANT works often assume a managerial, instrumental focus (Latour, 1999; Law, 1999). Whittle & Spicer (2008) point out that although translation is often discussed in terms of the "four moments", translation could involve more moments than this and be "ongoing, iterative, disorderly and disjunctive, rather than a linear one-way process (p. 619)".

Sometimes the concepts associated with translation have been utilised with other ANT concepts such as that of the "factish" and making do which have allowed other themes to be developed that were buried in the use of translation alone (McGrath, 2002). McGrath's case is interesting because using the notion of the factish, (a combination of fact and fetish that does not force us to choose between knowledge and belief) she is able to propose that IS development and management should address both emotional and cognitive elements and the relationships between the two, and illuminate the importance of improvisation, an issue that did not emerge in the analysis using translation alone.

IS ANT research often follows the implementation of new technologies and thus often talks about translation in terms of the stabilization or attainment of durability of networks or the failure to achieve durability or stabilization in a way reminiscent of the literature on the success or failure of implementations or IS development projects. Terms such as "irreversibility" or "black boxing" and "order" are used, even though authors usually acknowledge that this durability is never absolute (Vidgen & McMaster, 1996; Walsham & Sahay, 1999; Holmström & Stalder, 2001). Related to this is the notion of competing networks, and how they can align with new or changing networks or compete for alignment of actors to work out what will be carried forward and what will be left behind (Scott & Wagner, 2003) or cause failure (Holmström & Stalder, 2001). Other work (McGrath, 2002) argues that change mixes up success and failure and that somehow in thinking and writing about it we "should respect these entanglements instead of trying to unravel them" (p.251). In their work on the

introduction of an ERP into an Ivy league university Scott & Wagner (2003) also reflect on their finding of a messy, hybrid socio- technical system and how this makes decisions regarding success or failure difficult and likely to be more of an expression of a political position than a “fact” although the presence of the ERP is one.

Others have given their work an “ANT flavour” (Heeks & Stanforth, 2007), for example, utilising the concept of the symmetry of human and non human actors; or how an actor network is aligned by a single dominating actor, an obligatory point of passage; and later with more complex use of ANT how actors align with different, but intersecting actor networks (Hanseth et al., 2006) that are only ever partially aligned, interconnected, ordered. IS studies of ANT reflect this as they understand and enact that as complexity increases stabilization, closure, durability may not be achievable and instead IS researchers and practitioners have to deal with “multiplicities, inconsistencies, ambivalence and ambiguities” (Hanseth et al., 2006 p. 566).

Heeks and Stanforth (2007) utilise the conceptual base of the local and global networks drawn from Law and Callon (Law & Callon, 1992) to provide an explicit understanding of the political interactions of stakeholders in an e-government initiative. They find that examining the mobilisation of a global network resourcing project, a local network implementing projects, with the project as the single connection between the two, provides understanding of complexity and power in IS e-government applications.

Another study follows what it calls a genealogical process that reflects the emergent negotiation of IS definitions and requirements across the boundaries between organisational interest-groups in an IS design team (Gasson, 2006). It follows the trajectory of actions and interactions engaged in by the team analysed as a narrowly defined actor-network involved in the co-design of business and IT systems. It utilises concepts from ANT to analyse translations observed. It analyses inscriptions as boundary objects; as knowledge-transfer mediation artefacts. In IS research, inscriptions tend to be materialised in technology (Monteiro, 2004).

Sometimes ANT is used in conjunction with other theories. For example Holmström & Stalder (2001) invoke ANT to present the heterogeneous nature of the network of actors and technology drift theory to understand how and why people adapt to technology and technology adapts to people with data gathered during the introduction of electronic cash in Sweden. Scott and Wagner (2003) utilise ANT in conjunction with the process theory concept of temporality to illustrate how an ERP project can have differing clock and multiple subjective

times and how these differing perceptions of time can shape an IT-enabled program of organisational change.

Despite the general concept of symmetry, and the use of the terms “actor” or “actant” for material, social and technological entities with agency in the network, in some of the ANT literature types of actors, especially non-human actors, are often given other names, such as objects (Star & Griesemer, 1989), inscriptions, (Walsham, 1997), or mediators (Latour, 2005). For example Star and Griesemer (1989) developed the useful concept of boundary objects. Boundary objects are objects which are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They identified four types of boundary objects, standardised forms; repositories; coincidental boundaries; and ideal types. A further type, the visionary object, was developed and utilised in an ANT analysis of an ERP implementation (Briers & Chua, 2001) and ERP integration (Dechow & Mouritsen, 2005).

In addition to empirical papers, IS researchers also address ANT from a theoretical point of view. For example, Doolin and Lowe (2002) propose that ANT through its lack of constraining structure and ontology; its emphasis on empirical work; and the act of tracing networks and actions can reveal not only how things are, but also how things could be and therefore can provide critique of the type called for in critical management studies.

In terms of method, few of the IS authors explicitly mention the use of ANT as a method, of following the actors and letting the actors tell their own story (Latour, 2005), or of adopting a “more generous sense of method” (Law, 2004). Some do. An early example is Walsham (1995a) who uses some of Latour’s “rules of method” from *Science in Action* (Latour, 1987) to explain the enrolment of IS researchers in the positivist tradition by journal policies, editorial boards, selection of referees and to explain the subsequent program of enrolment of allies for interpretive IS research by the building of a network. Most instead explicitly mention that they use interpretive or qualitative methods (Walsham & Sahay, 1999; Holmström & Stalder, 2001; Underwood, 2001; McGrath, 2002; Scott & Wagner, 2003; Gasson, 2006; Hanseth et al., 2006; Sarker et al., 2006) or a mixed methodology (Heeks & Stanforth, 2007).

3.3 CHOOSING ANT

By adopting Actor Network Theory my aim is to explain how entities (networks) “take their form and acquire their attributes as a result of relationships with other entities” in what Law calls “relational materiality” (Law 1999, p. 3). As I read about OA and IR I began to think that

their form arose from, and was acquiring attributes from, relationships between entities, for example the Internet and researchers' papers, and their relationships with another network called "scholarly publishing".

I see scholarly publishing as an heterogeneous actor-network, comprising as it does of a wide variety of actors who work together in complex, messy, unpredictable and not necessarily visible ways. Earlier work (Kling et al., 2003) also conceptualises scholarly communications as a series of related socio-technical metaphoric networks. Scholarly publishing is undergoing change and thus could be said to be in the process of being reassembled (Howcroft, Mitev and Wilson. 2004; Latour 2005). OA and institutional repositories are more than visions or technological artefacts. For them to work, they have to negotiate with actors already active in a far bigger and more heterogeneous network of scholarly publishing. Such a scholarly publishing network can be investigated in terms of not only researchers and writers, their papers, journals and their policies, peer review, libraries, the academic reward system and publishers, but also Internet, web browsers and repositories, copyright and intellectual property, even Internet protocols, as actors. Figure 3.1 provides a visual representation of some of the actors in the traditional scholarly publishing network and their relationships.

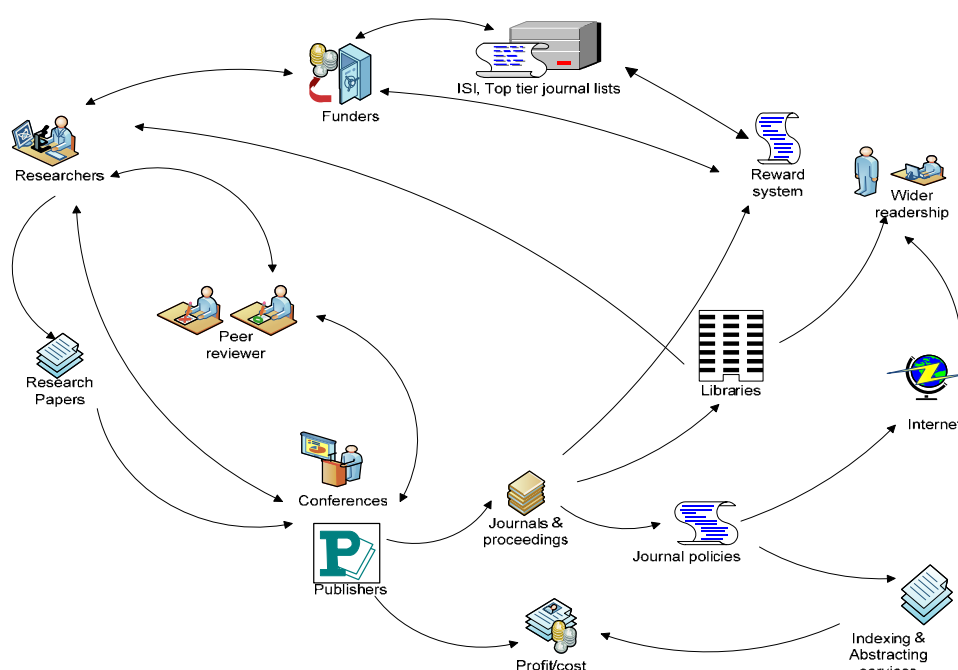


FIGURE 3-1: ACTORS IN TRADITIONAL SCHOLARLY PUBLISHING

Similarly we can use the concept of a network to represent the actors and their actions in OA (Figure 3.2). We can use ANT trace the local, for example, the institutional repository and its implementers to the global, OA Activists, or to another locality (Law & Callon, 1992; Heeks & Stanforth, 2007). We can follow the researcher at the micro level, to the Internet at the macro level (Callon & Latour, 1981). We are not limited to a “unit of analysis”; we can follow the traces of the actors wherever they lead in order for the story to be told. Many aspects of scholarly publishing are taken for granted by researchers and yet actors in the scholarly publishing network have agency in the construction and durability of OA and IR networks. I therefore propose using ANT to understand the development of new networks, the OA IR and the negotiation with existing networks such as scholarly publishing where the various networks are linked and transforming each other.

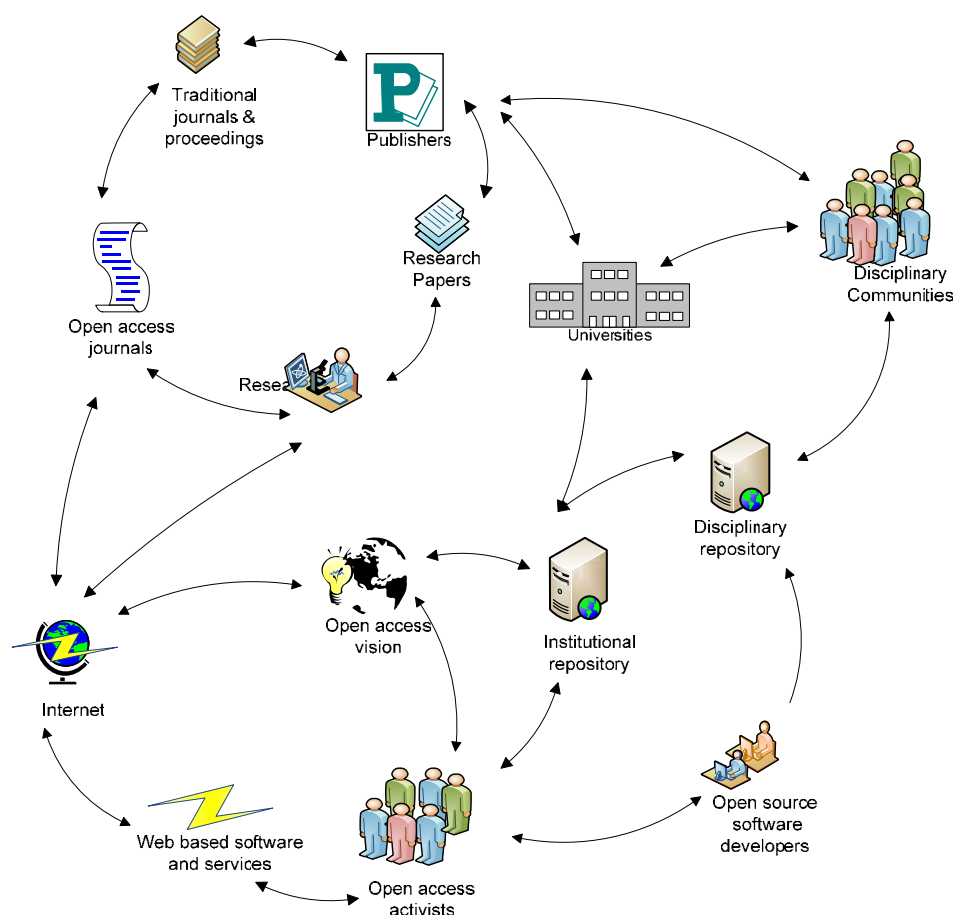


FIGURE 3-2: ACTORS IN THE OPEN ACCESS NETWORK

One of the implications is that we need to pay attention to processes, actors and events beyond the organisation where the IR is implemented as well as within the organisation

because the relations in scholarly publishing do not respect any boundaries, organisational or otherwise. Indeed, from our reviews of scholarly publishing, OA and IR, we see that the phenomena appear to be created and maintained by a network of aligned but separate individual, disciplinary, organisational, technical and other actors.

The more I investigated the more I found myself using “network” as a metaphor for the relationships between entities that comprise scholarly publishing. Reading the literature on scholarly publishing I saw how publishers constantly work to maintain the durability of the traditional scholarly publishing networks by engaging other actors, policies, researchers, readers, authors, libraries and more recently Internet and web services. I saw also how OA activists engaged by and with the Internet were creating new networks for scholarly publishing globally but working with, and enacted by, more local networks of institutional- and discipline-based OA repositories for research outputs. In Latour’s terms there was a “sort of action that is flowing from one to the other, hence the words ‘net’ and ‘work’ (Latour, 2004: p.64).

Further it appeared as if relationships with OA and IR were changing the attributes and form of related networks, specifically the scholarly publishing network and the academic reward network. Further OA and IR were achieving form as a consequence of the relations in which they were located indicating that they are “performed in, by and through those relations” (Law 1999 p. 4). This concept of performativity raised the prospect that if the relations cease to be performed, or enacted, then the network may be uncertain. The trajectories of OA and IR do appear to be uncertain.

As this research investigates the relational, emergent phenomena of OA and institutional repositories I elect to use ANT as my theoretical lens and methodological approach. To test my assumptions about the applicability of ANT to the study of scholarly publishing, and in particular OA and IR, I used Latour’s three tests for ANT membership: non-humans have to be actors with a type of agency; the explanation is unlikely to be “social”, no hidden social force is offered in explanation; and, that the study aims at reassembling the social (Latour, 2005: p. 10-11). The reviewed literature, the existing inscriptions on the OA and IR suggest that non-humans have agency. For example, the potential for free and open communication enacted by the Internet opened the black box of scholarly publishing to new networks for publishing and communication. This literature also suggests that scholarly publishing actors and connections are in the process of being reconfigured or reassembled. In doing so the literature, coupled with actions of activists and researchers, encourages its readers to consider the options and possibly enact them. I adapt ANT as a method which enables me to fathom some of the

complexities and controversies of scholarly publishing in the process by tracing the range of heterogeneous actors their associations and transformations.

Latour (2005) suggests that the use of ANT is appropriate in situations “where innovations proliferate, where boundaries are uncertain, when the range of entities to be taken into account fluctuates”. My reviews of OA and IR in the Introduction and Literature Review indicate that this statement could be seen to apply to scholarly publishing. In his early work, Latour (1987) represents formal scholarly communication (aka scholarly publishing) as an actor-network. His work reveals, among many other things, how human and non-human actors such as writers, articles, journals etc. attempt to enrol the authority of citations to reinforce the legitimacy of a piece of writing. My work aims to look at how existing actors (authors, readers, OA activists) enrol new technologies (Internet, repositories, OAI-PMH), and visions (OA) as actors to the existing publishing network and what changes this may bring about. The Internet and associated technologies are claimed to have wrought vast changes in scholarly publishing. Scholarly publishing relationships and alliances are in the process of being reassembled. While new actors are joining there is no obvious “social force” to offer in explanation of the changes taking place, and there is no obvious outcome or new network that will replace the current network. I believe that ANT provides a conceptual apparatus which may allow us to fathom the controversies of scholarly publishing by tracing the range of heterogeneous actors as they interact, form coalitions and negotiate changes in the course of adoption of OA IR.

3.4 THE RESEARCH QUESTIONS

As Mol and Law (2002: p. 6) point out “... a single text cannot be everywhere at once. It cannot do everything all at the same time nor tell all”. But what I would like to do in this text is to tell a story about complexity in practice. Many of the tropes about OA are simplistic. For universities - implement an OA institutional repository to free the scholarly literature, increase your visibility and possibly your reputation; repository managers - “implement a mandate” to solve your deposit problem; for researchers – make your work OA and increase your visibility and citations and benefit the world of scholarly communication. Yet OA and institutional repositories, while they do have increasing numbers of actors enrolled in their network have not yet formed a stabilized or black boxed network. Recognizing that reality is complex and often controversial we take the activity of examining scholarly publishing in relation to OA and

institutional repositories out of the hands of OA activists and publishers and into the plethora of ordinary sites and situations that researchers operate.

Being concerned with these current and dynamic developments and aiming to shed light on an emergent process this thesis investigates the implementation of an IR in two universities, seeking to address the following questions:

How and why is OA reassembling scholarly publishing?

What role does introducing an OA institutional repository to researchers play in this reassembly?

Gregor (2006) suggests that whether the questions themselves are worth asking depends on the state of knowledge in the area at the time of asking. At the time the questions were posed, understanding of OA and institutional repositories as they are enacted in practice was small and many questions being asked. Why, when it is apparent that OA has many possible benefits for them, do researchers not take advantage of it?

3.5 CHAPTER CONCLUSIONS

This Chapter has briefly summarised the different research approaches found in research in Information and Information Systems; positivist, interpretivist and critical. It then introduced a different approach - Actor Network Theory (ANT). A further brief account of ANT work already conducted in the information systems field was developed, followed by my rationale for selecting ANT as the approach for this study. Finally, building on the analysis of the literature on scholarly publishing OA and IR in Chapter Two and the discussion of research approaches in this Chapter; the research questions for the study are proposed. The following Chapter will build on this to tease out the ontological and epistemological assumptions underlying ANT and the research strategy I adopted.

CHAPTER 4

4 RESEARCH METHODOLOGY

“Write that down, the King said to the jury, and the jury eagerly wrote down all three dates on their slates, and then added them up, and reduced the answer to shillings and pence.” Lewis Carroll Alice in Wonderland, Chapter 8.

Chapters Two and Three demonstrate that scholarly publishing and open access (OA) could be seen as networks undergoing change and thus could be said to be in the process of being reassembled and therefore candidates for an ANT study (Howcroft, Mitev & Wilson 2004; Latour 2005). This thesis focuses on institutional repositories (IR), one method of providing OA. IR are created to store, preserve and disseminate research results in an institutional setting. There are multiple and diverse actors in OA IR initiatives. They include researchers, their research outputs, disciplines and academic units, scholarly communities around the world, library and OA technology, the Internet, university policies, research funding organisations and their policies. Some of them are individual or collective human actors while others are non-human actors. They are all actively involved in, dependent on, and continuously enacting the web of relations in scholarly publishing. Therefore to examine my research questions:

How and why is open access reassembling scholarly publishing?

What role does introducing an open access institutional repository to researchers play in this reassembly?

I wanted to study this web of relations in scholarly publishing: But how to study it was not straightforward. While there were many examples of applying and adopting ANT, there are no prescriptions or clear rules to follow. In fact, prescriptions, procedures and rules would be incompatible with the key ideas of ANT as a method (Law, 2004). Although I learned a lot from other ANT-informed work I needed to find my own way of living ANT and doing an ANT study, dealing with complexities and ambiguities, and answering many difficult methodological questions on the way.

In the previous chapter I discussed several of the major approaches to research in the information fields, introduced ANT and ANT in the information context and summarised my reasons for selecting ANT. In this chapter I briefly summarise the ontological and epistemological positions underlying this study, after which I describe the nature and

characteristics of an ANT field study conducted to answer my research questions and finally I discuss some important methodological issues I grappled with in the course of my study.

ANT presents problems for operationalisation which this Chapter discusses. The research strategy undertaken is discussed, beginning with the rationale for the selection of cases, and following through with, and proposing one way of operationalising which was utilised for the conduct of this study.

4.1 ONTOLOGICAL AND EPISTEMOLOGICAL QUESTIONS

As an approach to socio-technical analysis ANT “treats entities and materialities as enacted and relational effects, and explores the configuration and reconfiguration of those relations” (Law, 2004, p. 157). Major ontological categories such as humans, technologies, and society are treated as relational effects. In other words ANT is based on an anti-essentialist ontology by not presuming that actors – humans and non-humans – possess essential characteristics; but instead treating them as enacted and relational effects. For instance human actors such as researchers, editors, IR technology designers, as well as non-human actors like research papers, reward policies, journal ranking lists, IR technologies, are seen as effects or outcomes of relations emerging in academic publishing actor-networks. These actors are not assumed to exist “out there” with inherent properties and characteristics that determine their “effects” on other actors across settings and situations, which characterizes essentialism and determinism (Grint & Woolgar, 1997; Leonardi & Barley, 2008). As actors are enacted through relations; their properties and characteristics are brought into being and continuously reproduced and recreated in actor-networks. Actors therefore have no standing, meaning or relevance outside the many possible networks within which they act.

The anti-essentialism of ANT has been both misunderstood and criticised. For example, Whittle and Spicer (2008) claim that “ANT in fact continues to rely upon the notion of inherent agential capacities when attributing properties to natural and material objects” (p. 614). They assume that ascribing any properties or any characteristics to material objects that then explain certain effects means *de facto* an essentialist position. This is an important point that I feel needs further explanation. The ANT assumption that actors do not possess given, inherent and innate properties does not mean they have no properties at all. Furthermore, these properties are brought about, reproduced and recreated through relations among actors. A material object, such as technology, is thus assumed to have some characteristics, implying certain constraints and certain affordances for its users (Leonardi & Barley, 2008) that at the

point prior to its implementation they result from the actor-networks of their development. This simply means that this technology that developers deliver enables users to do certain tasks (due to its affordances) and at the same time constrains the users in doing their tasks in particular ways. During the technology adoption process, however, which is always situated and emergent, users interact with technology, interpret its properties, and experience some constraints and some affordances (not necessarily those intended by the designers). Sometimes they change, potentially with the help of the designers, some physical features of the technology to better suit their needs. The adoption process can be seen as another actor-network only partially (if at all) overlapping with the development actor-network. The properties of technology are neither inherent nor innate, they are emergent: enacted and recreated through relations in actor-networks. This is far from an essentialist position as Whittle and Spicer (2008) allege. ANT on the contrary postulates the relational nature of properties of actors.

This brings me to the question of agency. As ANT makes no *a priori* distinction between humans and non-humans, it assumes each have agency. That is that the behaviour of one can modify the properties, the state of affairs and behaviour of another. The agency of both humans and non-humans has a relational effect. In such a way ANT explicitly includes non-human actors (material objects like water pumps, accountancy systems, or IT infrastructure) into the focus of a study. The agency of non-humans and how we learn about it have been questioned (Whittle and Spicer, 2008). Are we *de facto* attributing anthropomorphic capacities to non-human actors? If the non-human actors cannot speak for themselves how do we learn about their agency? As a contribution to this debate I suggest that non-human objects have agency in the actor-networks by enabling or disabling certain relations: by making some actions by other actors effective, legitimate, ethical, (or otherwise), for example, as well as influencing yet other actors to take particular actions. For instance journal ranking lists influence academics' selection of publishing outlets; a journal policy that allows post-print OA depositing makes it legitimate and ethical for an academic to post a published paper on IR; IR technology that assists academics in posting their papers through a user-friendly interface and efficient back-office processing may encourage IR publishing (academics actions). In each of these cases, it is human beings that create or transform these non-human actors (journal rankings; journal policy; IR technology). But how a non-human actually acts only partially depends on the intentions, objectives and interests of the human creators (which are 'inscribed' into the non-human actor). The agency of the non-human actor is occasioned in the

relations with other actors (e.g. academics) and therefore also depends on their intentions, objectives and interests. As Latour suggests the non-human actor is made by humans, substitutes for the actions of humans and shapes human action by its affordances. Thus they act. How we write about their actions, their agency is moot. ANT brings to the open the intertwining and entanglement of human and non-human actors involved in relations in the dynamic actor-networks.

Studying and understanding the agency of non-human actors however is not easy. It requires different strategies to find out, typically by observing or experiencing human interaction with them in different situations and how they change in time. We need to keep in mind that we are sensitive to the changes of both the non-human actor and its relationships with others over time. More broadly, an ANT study follows the actors to investigate how heterogeneous actors align their interests and interact to form or change their actor-networks (Callon, 1986; Howcroft et al., 2004; Law, 2004; Latour, 2005).

Having continued the work of others working towards the explication of the ontological underpinnings of ANT, I now turn to its epistemological foundations. In terms of its view of the nature of knowledge and how knowledge is created, ANT has been claimed to embrace epistemological relativism (Whittle and Spicer, 2008). Relativism is often related to interpretive approaches in opposition to the singularity of positivism (Neuman, 2003). Some authors of ANT works do not reject epistemological relativism and claim that it is merely an acknowledgement that between groups the standards in different communities for obtaining “good” knowledge vary. To accept the reality of epistemological relativism does not mean there are no standards, nor does it commit one to embrace moral or political relativism (Law, 1991). In later works the same author critiques relativism and its associated pluralism, and the singularity of positivism in accepting there is one right perspective of reality, in favour of multiplicity and the generation of fractionality in practice (Law, 2004). Multiplicity refers to the simultaneous enactment of objects (that are said to be the same) in different practices. Law (2004 p. 64) illustrates multiplicity using the example of a fellow researcher: Strathern-the-anthropologist is not the same as Strathern-the-feminist; however neither are they entirely separate from each other. Each includes the other but cannot be reduced to the other. OA is OA, but is enacted by some (for example some publishers) as a threat and by others (for example some researchers and activists) as a possibility.

ANT is also critiqued for offering a “superior or expert” view, or a managerialist view, and thus disregarding the views of actors and exhibiting a lack of reflexivity (Whittle & Spicer, 2008, p.

118). Similarly ANT has been criticised for applying Callon's four stages of translation as a series of deductive tests to confirm or refute the model rather than as a sensitizing concept (Cordella & Shaikh, 2006; Whittle & Spicer, 2008). However, if the researcher adopts the epistemology of ANT he or she is encouraged to allow the actors to speak for themselves. ANT is a theory about ways of "doing" or "seeing" social research, "people, machines, ideas" (Law, 2003), or a theory of method. As Latour (2005; 142) suggests ANT is "a theory about how to study things...how to let the actors have room to express themselves". If this advice of allowing the actors to speak or express themselves is followed, then charges of ANT adopting a more managerialist and less reflexive view are more likely to be criticisms levelled at the application of ANT rather than at the intention of ANT.

Related to the criticism of a managerialist approach is the argument that allowing the actors room to speak for themselves where the researcher is apparently neutral, results in descriptions of existing networks that ignore politics and power relations and reinforce the current state of affairs (Whittle & Spicer, 2008). However, neutrality is not necessarily the intention of ANT. I would argue along with Latour (2005: p.57) that researchers engage in the world making activities of those they study. Merely selecting an area to research, if the research is published and read, will expose the controversies and matters of concern of the actors under study. As I discussed in Chapter 3 Law (2004) proposes that research approaches and their associated methods do not simply describe the world as it is, or as they see it, but they enact it. If we can accept that this is true then those of us undertaking social enquiry can think about the sort of world we want to help enact. In writing this account I wanted take part in enacting a world where researchers seriously consider OA as a part of their publishing process and to understand more about what roles institutional repositories might play in enabling OA.

4.2 RESEARCH STRATEGY

The research questions lead me to seek rich, deep information, about how researchers and implementers themselves understand and enact the emerging phenomenon of OA and IR and how these emerging phenomena open or fail to open the black box of scholarly publishing and contribute to its reassembly. The key research strategy therefore is an *ANT field study* which I define as a particular kind of field study underpinned by ANT ontology and epistemology. Like any field study such as a case study, this study focuses on "contemporary phenomenon within [its own] real-life context" (Yin 2003, p. 1). Furthermore, as a field study it requires researchers

to immerse themselves in the field, interact and share life experiences with other actors. It also involves detailed analysis of the context, of actors and their actions, as well as their emerging relations with other actors. Given the heterogeneity of the actors it requires multiple techniques of data collection and interpretation (Benbasat et al., 1987; Neuman, 2003). Furthermore, unlike other types of field study, an ANT field study does not treat differently what is commonly seen as the micro and the macro (Benbasat, Goldstein & Mead 1987; Neuman 2006; Yin 2003). The network is not of the macro or the micro, the global or the local, but the continuous trail or structure that is related, connected and associated (Law, 2003; Latour, 2005) and this study aims to trace the related connected and associated.

As with a conventional field study, an ANT field study cannot have clear boundaries at the outset of the research. However, an ANT field study continues as a boundary-less study, and intentionally so. The boundary of the reality observed may expand in any direction that the actors lead the researcher. This is both a blessing and a curse. It is a blessing as the researcher is set free to investigate actors and networks as they emerge and transform. There is no sense of artificial limits to the study either in terms of expansion in space, or expansion in depth. Boundary-less-ness also poses problems. Our resources and our time constraints mean we can only go so far. The investigation has to end sometime and somewhere. When and where to stop are difficult questions.

While initially I had no clear view where I was going and when and where I'd stop, I gradually learned how to deal with it. As I followed the actors and traced their actions within multiple actor-networks I reached a point of intimacy and comfort, being in and acting within these networks. As an actor myself, I was part of the networks I studied. As a researcher at the University I changed and developed through relations with other actors – academics, OA IR technology, journals, research papers and policies. I engaged with IR technology and tested the interface, gave feedback to developers and eventually self-archived or deposited my own papers. I also investigated disciplinary repositories and decided that it is beneficial for me and my colleagues to deposit our papers in them. I shared my views and experiences of OA, IR and DR with other PhD students and academics within my University and beyond.

This activity is an indication that I actively engaged in scholarly publishing and OA actor networks. Engagement and entanglement were the key to exploring those networks, understanding them and questioning them, and lead to an intimacy with them. Ultimately I felt as a fully accustomed 'resident' in these networks, an actor, mutually entangled with a multitude of other actors, close and distant. I was an active contributor to the transformation,

strengthening, or weakening of these networks. I was living the life of these networks. While there is no end point in such a research life, I was aware that I reached the level of understanding of the networks as well as acute awareness of their vastness and complexity that seem sufficient to achieve my objectives and answer my research question with reasonable confidence. Further study, for another 3-5 years is going to be interesting as the pace of change is likely to accelerate and is therefore recommended for future scholars. There is a body of writing addressing the issue of studies which are not action research, but are performed by an insider within an organisation variously termed self-ethnography, insider studies, engaged studies and close-up studies (e.g. (Nandhakumar & Jones, 1997; Alvesson, 2003; Brannick & Coghlan, 2007). This work has learned from these works, but given the ideas expressed therein a more “ANTish” edge.

Finally I’d like to discuss issues of generalisability for ANT field studies. As with other case or field studies, questions may be raised about the representativeness of a case and the generalisability of results, especially by those unwilling or unable to understand and appreciate the very nature and value of in-depth and in-context studies. To respond to such concerns I would agree with others who claim that a particular case or cases are relevant in themselves for the creation of knowledge about the phenomena they exhibit. It is not ‘representativeness’ that makes them relevant and valuable but the insights and depth of understanding they provide. Furthermore, case or field studies are “instructive beyond [their] specific site” by providing a depth and richness that “sensitize the reader to events and situations elsewhere” and thereby enable the sharing of experiences and learning by others not involved in research. Knowledge created may thus be transferable or translatable to their own situation, which may “symbolize a range of experiences, relations of a variety of different kinds” (Mol & Law, 2002).

4.2.1 SELECTION OF THE CASES

Following a Government initiative and the creation of a Consortium of (initially) three universities, to investigate and implement IR, one university was selected to which I later allocated the pseudonym Janus University. However, as my ANT study progressed, through actors from my initial case I learned about and contacted actors from another university which I provided with the pseudonym Jupiter University. While IR development and implementation at the Janus University emerged very slowly, Jupiter University was at a more advanced stage. Jupiter presented an opportunity to extend my investigation and analysis to another location

at a more advanced stage. It did not initially belong to the consortium, but now does. Both cases are introduced below.

Naming rationale

For the story that unfolds in this thesis I draw upon my research and experience in two universities in Australia. Each university was chosen as a field study site for a different reason. The first was chosen because it was implementing an institutional repository at the time I was proposing to conduct my research, and was happy to have me follow the implementation and learn from it. I came to know this university as Janus University named after Janus, god of door and gate. Janus lives at the threshold looking both forwards and backwards (Purcell, 1998). Janus seemed to me to be an appropriate name as it symbolized the ambivalence I found in this university towards OA and institutional repositories. It looked forward to OA by implementing a repository, but it also looked backwards incapable of resolving its conflicting relations with traditional scholarly publishing.

The second case emerged in the course of my ANT study that naturally expanded beyond the boundaries of the first university. Being one of the earliest Australian universities to implement an institutional repository it inevitably entered into my research space. The contrast with Janus University was appealing: The university decisively focused on making an OA institutional repository from the inception of the university. On finding synergies between OA and its own university mission, this university mandated that its researchers deposit a copy of their research outputs in the repository. It was a show of strength and power that encouraged me to name this university Jupiter University after Jupiter Optimus Maximus (Jupiter Best Greatest), sovereign god of the Romans (Scheid, 1998). Jupiter ruled over laws and social order. The name Jupiter University symbolises the taking of decisive action such as the mandate.

While they are by no means intended to be representative of all universities' approaches to the building of OA institutional repositories, both Janus and Jupiter richly express the ambivalence, contingencies and dynamics involved in these attempts.

4.2.1.1 JANUS UNIVERSITY

While implementation of OA institutional repositories is occurring and there is much discussion regarding the role of such systems and the effects they may have, at the outset of

this study there was little actual research examining the interplay between OA, IR and researchers in the context of the introduction of an IR. Therefore, I believed, a case study, following the actors during an actual implementation would provide useful insight. The case at Janus University presented itself. Janus University was in the early stages of an IR implementation; key human actors were willing to give me access to the people, materials and technologies of the implementation. It was a part of a consortia project which was funded by the Australian Federal Government's Department of Education, Science and Training (DEST) in October 2003 for three years from January 2004 to establish institutional repository in three university consortium partners. A fourth partner joined to trial a federated resource discovery (search) system of Australian institutional repositories. Janus University does not have a vision or mission statement that reflects the importance or otherwise of research to the university that is easy to find from their web pages. They do however have a statement of strategic intent which cites the university's "aspiration to be a leading research intensive university in the Asia Pacific Region, focusing on contemporary and social issues through defined strengths in the professional and scientific field – a peer in good standing with the best globally".

Janus University was the first site selected because it had just begun the implementation of an OA IR. At the time this research began many of the 38 Australian Universities were implementing or were considering implementing, institutional repositories. Janus University is a large research and teaching university in one of Australia's largest cities. Established approximately 60 years ago, it has a broad disciplinary base and has expanded rapidly around 42,000 students, including more than 7,000 international students from over 130 different countries. In 2007 Janus University had approximately 4,168 academic staff (2,210 equivalent full time).

Janus University was planning to pilot their institutional repository in 2006, using Fedora institutional repository open source software with a commercial proprietary self-submission system and user interfaces and management tools. The implementers aimed for the implementation to focus on issues of user and organisational requirements rather than the technology. On a pragmatic level the University's representatives were willing to provide access to people, information, information systems and documents. Individuals within the university were also prepared to share their time and insights.

The research questions aim to increase understanding about how and why OA and institutional repositories are contributing to changes in scholarly publishing. Following the actors in a

repository implementation, observing and asking questions about their behaviour, answers to the questions might be revealed, even enacted. I followed actors, not just through the local implementation, but through to the more global basis of their publishing practices. However, the implementation did not proceed to plan. It was difficult to find and interview researchers who had actually used the repository, or who even had clear views of what OA and IR were. Figure 4.1 denotes the delayed timeline of the project.

Phase	Dates	Planned activity	Actual Activity
Phase 0	August 2003 October 2003 January 2004		Bid submitted Bid accepted Appointment of Consortium Project Manager
Phase1	January 2004 – December 2004	Demonstrate	June 2004 Notification of software choices Appointment of Janus University Project Manager June 2004 – March 2006 Janus Project Manager seeks researchers and Schools to contribute, and harvests from university web pages, working papers, technical reports, honours theses etc.
Phase 2	January 2005 - December 2005	Deploy	Merged demonstration and deployment May 2006 Project Manager 2 appointed. Demonstration and some deployment. February 2007. DEST hold briefing sessions explaining repositories would be used for RQF Collection, and so “dark” or closed archives of publisher copies need to be created. Some effort moves to this focus. June 2007 Project Manager 3 appointed February – December 2007. Parallel development of dark and open archive. September 2007. University Legal office requires addition of up to ten points of Copyright agreement detail on deposit form. Causes further delay.
Phase 3	January 2006 – December 2006	Distribute	December 2007+ Distribute – soft launch announced at Academic Board.
Postscript	2008+		Distribution January 2008+ Outreach librarians promote to researchers. As at October 17 2008 2,425 deposits. 241 were Research Masters Theses 1,257 were PhD theses, 927 deposits of eprints, but only 245 2008 documents (more detail Chapter 6, Section 6.1.5).

TABLE 4-1: JANUS UNIVERSITY IR IMPLEMENTATION TIMELINE

According to the original plan the repository should have been launched at the end of 2006. In December 2007 there was a “soft launch”. The repository was announced at Academic Board. There has been no general announcement of the repository to the university community; however, faculty liaison librarians assist in promulgating the repository and OA. Take up is slow.

The questions raised by this research sought information from researchers who were familiar with OA and IR, who might add insight to how OA and IR might contribute to the reassembling of scholarly publishing. At the time the research was being conducted the Janus University implementation was in a hiatus, and it was becoming difficult to access actors experienced in using an IR.

4.2.1.2 JUPITER UNIVERSITY

My reading led me to articles published by the Repository Manager at another University, Jupiter University. I was fortunate to meet this Repository Manager at a workshop on institutional repositories. We discussed my work and her work and I realised I would have much to learn about OA and IR from her, from the researchers who used her repository, from her colleagues in the implementation and from other actors at Jupiter University. I sought permission from the appropriate representatives at Jupiter University to conduct further study there. The Repository Manager gave me many names of enthusiastic users and opponents of the repository, and some of them consented to interviews.

Jupiter University is another of Australia’s larger universities with 40,000 students. However in 2007 it had a smaller number of academic staff, 1,307, which accounted for 1,127 full time equivalents (a smaller number of casuals and part-timers than Janus). It was created in the 1980s from an amalgamation of colleges and has a technological focus. It “aims to strengthen its distinctive national and international reputation by combining academic strength and practical engagement with the world of the professions, industry, government, and the broader community” [Jupiter University web page “Visions and Goals”]. It cites as among its five key goals those of “building research capacity”, strengthening [Jupiter University’s] position in teaching and research “through better partnerships across internal and external boundaries”, integrating ICT into all functions, including research and to develop an “environment that will foster and reward high-quality scholarship and that will build a sense of community”.

Research and promotion of its research is therefore central to the university's stated goals. The development of an OA institutional repository fits clearly into three of the five goals, in ways such as enabling access to research across internal and external boundaries and integrating the relatively new ICT of OA repositories into research. The formal vision and goals may therefore have acted in such a way as to support human actors introducing the idea of an OA IR.

The Jupiter University site was selected because it had implemented an OA IR and done so relatively early in the history of OA repositories. In 2002 a senior leader, and Deputy Vice Chancellor (DVC) at Jupiter University influenced by the OA movement and encouraged by the development of practical applications to support the movement, opened the debate at Jupiter University. In May 2003 a draft repository policy was tabled at a meeting of the Research and Development Committee. By September 2003 Academic Board had endorsed a policy requiring academics to deposit their research outputs in an institutional repository. The policy was to become effective on the 1st January 2004.

As the policy was being debated and approved, funding was allocated for the appointment of a project officer to oversee installation of repository software and advance the mandate by aligning the IR with the interests of researchers. The project officer was appointed in June 2003 and the repository was launched in November 2003.

The project was situated in the University Library. The Project Officer oversaw the project and was assisted by the Library Systems department. The Library Systems Manager looked at the only two real options for repository software that were available at the time, which were two open source software packages, DSpace and EPrints. She made a decision to go with EPrints. EPrints is an open source software package for OA repositories developed at the University of Southampton School of Electronics and Computer Science and released under a General Public Licence (GPL). EPrints is compliant with the Open Archives Initiative Protocol for Metadata Harvesting. EPrints appeared to require less technical skill than DSpace for installation and maintenance. It was installed on pre-existing servers in the library. Little customization was performed at first, partially from lack of documentation (this was early on in the history of repositories) and partially because they would seek feedback from users as they customized. The only initial customization was a branded front end and some tweaking of metadata fields to fit the Australian Higher Education environment. Take up of the system was slow at first, only 425 items in the first 12 months; however, in 2007 nearly 4,000 items were deposited. Table 4.2 below presents the timeline for the Jupiter University IR implementation.

Phase	Dates	Planned activity	Actual Activity
Phase 0	2002		DVC's previous interest in scholarly communication and OA culminates in resolve to implement an OA institutional repository
Phase1	2003	Implementation of policy for deposit in IR Implementation of IR	May 2003 – Draft policy for deposit policy presented to research and development Committee September 2003 – Policy endorsed by Academic Board June 2003 – Repository Project Manager appointed, OSS software selected June – November 2003 – Project manager collects “low hanging fruit” and begins to enrol researchers.
Phase 2	2003-2004	Deployment and distribution of IR and (mandate) deposit policy	November 2003 – IR launched January 2004 – Policy takes effect January 2004+ Strong recruitment program, emphasising the benefits to individuals, the university and scholarship, continuing and ongoing
Postscript	2007 and 2008		As at September 2008 over 9,000 deposits. As at October 2008 1,895 deposits listed for 2007 (3 theses) and 903 (2 theses) for 2008

TABLE 4-2: JUPITER UNIVERSITY IR IMPLEMENTATION TIMELINE

4.2.2 COLLECTION OF THE EMPIRICAL MATERIAL

The rules and norms of method are usually associated with the epistemology and ontology of the researcher and her project (Law, 2004 p.40). ANT, however, operates outside of the usual paradigms, and offers its own ontological and epistemological assumptions (discussed earlier in Chapters Three and Four). This calls for new methods of viewing, collecting and analysing empirical material. Law (2004) refers to going beyond, for example, laboratory benches, questionnaires, interviews and statistical and qualitative analysis and into tacit knowledge, language, and the priorities of funding bodies and so on. He terms this method assemblage, which I interpret as the way of describing and doing research. More simply put Austrin & Farnsworth (2005: p. 148) propose that ANT, particularly Latour's work, can be likened to detective work; tracking and tracing actors to reveal “unforeseen elements and the practices that constitute them”.

How did I do my research? I started out by reading, in the course of my work as a librarian, texts about scholarly publishing, OA and institutional repositories. I attended a conference at which several OA activists presented their views. I discussed the issues. I became interested in

the area, and as part of a course I was doing on research methods, proposed research in the area to my colleagues and lecturers. This proposition turned into a formal course of study for this PhD. Once it turned into a formal course of study, I began to be more rigorous about my methods. I began to keep notebooks in which I recorded my observations and interactions with people, inscriptions, repositories and other sources of empirical material. I made notes about their actions and relations. I taped and transcribed interviews. I wrote about what I saw and I shared my writings with actors who shared their thoughts with me, with my supervisors, and occasionally in publications.

Early in my research I saw and felt ANT would be a useful approach to this study. Accordingly in my “data gathering” I looked for connections and traceable associations between actors in scholarly publishing, OA and institutional repositories. I let the actors deploy their controversies and observed their actions, relationships and transformations. I endeavoured to allow the actors to become informants and theorists (Latour, 2005: pp 5-11). I followed the actors from one to another and tried to render visible the associations and transformations

As my study progressed I identified actors by tracing the actor-networks seeking alignments and understanding. The use of multiple techniques and a range of information and data sources provided triangulation (Gorman and Clayton 2005; Mingers 2001) which complement Walsham (2006) and contribute to the writing of an account of the phenomena to increase understanding. ANT’s aim is to record, not to filter out, to describe, not to discipline (Latour, 2005: p. 55). Figure 4.3 illustrates the actors whose traces were followed for the study that began in Janus University and Figure 4.4 illustrates the actors followed as the study moved to Jupiter University. The arrows in the figures indicate how the actors lead one to another. Other actors left traces disclosed, discovered, discussed by these actors, as shall become apparent in the following chapter.

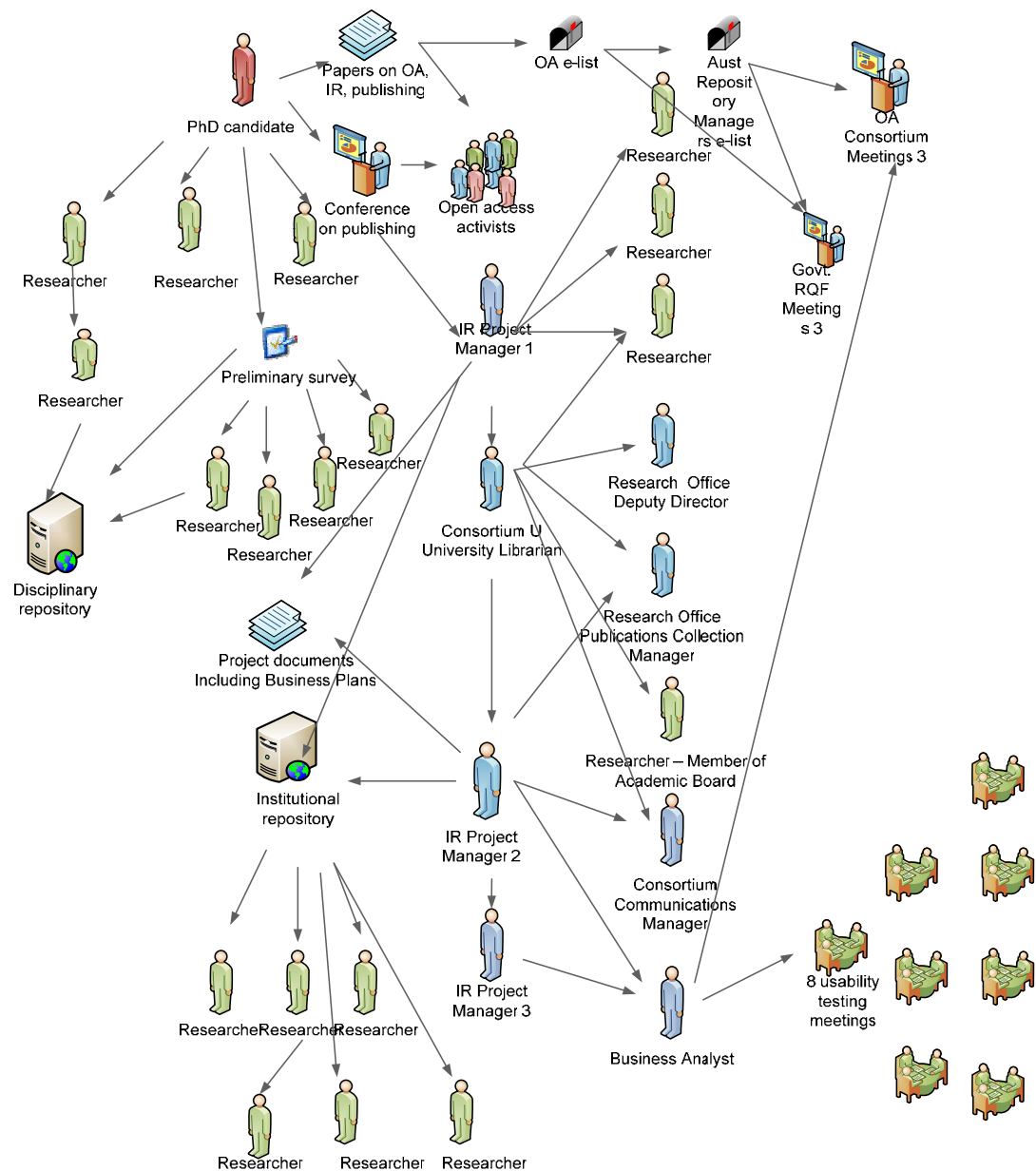


FIGURE 4-1: FOLLOWING THE ACTORS AT JANUS UNIVERSITY

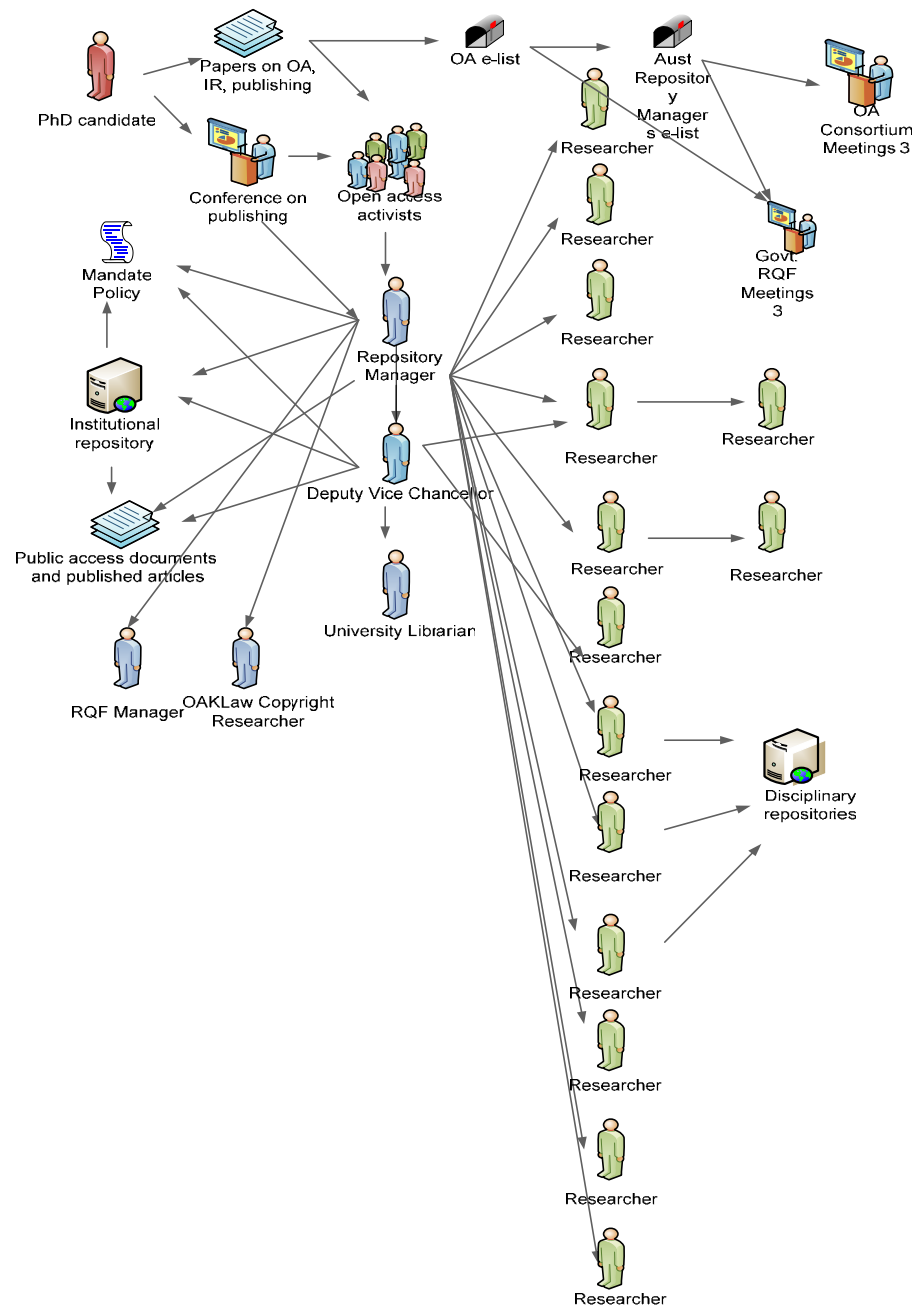


FIGURE 4-2: FOLLOWING THE ACTORS AT JUPITER UNIVERSITY

This research is seeking a rich, deep understanding of the heterogeneous networks of scholarly publishing, OA and institutional repositories, thus the empirical material used to illuminate the research question is largely of a qualitative nature. The empirical material is not new data

generated using instruments such as surveys⁴² or experiments, but information gathered from a variety of actors and assembled to craft and enact depictions of OA and IR in the case organisations. Empirical material was collected in a number of ways, from system planning and implementation documentation, emails, observation and minutes of meetings, IR technology documents, and from semi-structured interviews with both implementers and researchers, and observation of the environment and capture of information distributed regarding the implementation to potential users and managers.

Interviewees do not constitute a representative sample of academics, disciplines or decision making regarding publishing choices and OA; rather they present and discuss different views and actions that help illustrate the range and variability of attitudes and behaviours in the networks under study. Because scholarly publishing is complex, it may act differently in different parts of its network, for example among publishers and scholars, scholars from different disciplines, different societies, different parts of the world, and different types of institution. Working in this area requires dealing in multiplicities not singularities. This research does not deal with a single disciplinary type or a scholarly archetype, but with actors who have partial connections through their institution, their country, their repository. So we accept this multiplicity and complexity and aim our study at the places where these things come together in two institutional repositories (Mol & Law, 2002). Similarly moves to inter-, multi- and trans-disciplinarity encourage this broader focus (Davies & Devlin, 2007). This study has not focused on one or a few disciplines, but more generally in the academic arena.

The empirical material for both cases comes from a variety of sources. First the literature, both advocacy and research was consulted. For sources within the cases, theoretical sampling of a purposeful nature was appropriate (Eisenhardt, 1989). Implementers were interviewed at first, and they then recommended researchers who were trialling the system. In addition, people who had expressed a contrary view were also sought out, to provide a broad picture. Material also came from attending meetings between the IR business analyst and researchers who had been testing the IR system and a variety of other sources. The sources Janus University are listed in Table 4.1 below. This table also presents the ways in which the actors expressed themselves and the material traces that were used to conduct the analysis and description.

⁴² At the very beginning of this work a survey (Kennan 2006) was conducted within Janus University to gauge understanding of researchers' understanding of OA and IR prior to the introduction of the IR. Some respondents in the survey noted that they would like to discuss OA or IR and these researchers are the four referred by the survey in Figure 4.3.

Interviews were verbatim transcribed, and observations and other notes recorded in a series of notebooks.

Actors from Janus University	Actors express themselves	Material traces
University Library	Policy Documents	Web pages, policy documents, files, repository
University Librarian	3 interviews, conversations	3 interview transcripts, emails, researcher notes, documentation
IR Project Manager (3 people)	6 interviews	6 interview transcripts, emails
Business Analyst	2 interviews, conversations 8 Usability testing meetings	2 interview transcripts, emails, meeting transcripts, introductions to researchers, researcher notes
Consortium Communications Manager	1 Interview	1 interview transcript Access to consortium e-mail group
Federal Government	Policy documents, Public Meetings,	Web pages, meeting notes, public documents
Janus University	University policies	Web pages, handbooks, official communications
Policy Makers: Deputy Director - Research Office	1 Interview	1 interview transcript
Publications Collection Manager	1 Interview	1 interview transcript, email clarification
Active researchers from Economics, Finance (2) , Information Systems (2), Science (4), Social Science (2) , Engineering (3), Humanities (3), Information Science (1)	1 Interview 2 Interviews 2 Interviews 4 Interviews 2 Interviews 3 Interviews 3 Interviews 1 Interview	1 Interview transcript; editor of OA journal, Repec deposits 2 Interview transcripts; one actor deposits in SSRN 2 Interview transcripts, one actor experimenting with IR 4 Interview transcripts; one actor deposits in arXiv 2 Interview transcripts 3 Interview transcripts, one actor converting technical reports for IR. One actor experimenting with IR 3 Interview transcripts 1 Interview transcript
University community	Open Meetings (3) where the university explained its and the Government's publications' reporting and	Meeting documents and observations, notes, rewarding some types of publishing not others

	research assessment criteria and (8) usability consultation meetings between the IR business analyst and academic testers of the system from Law (2) , Cancer Research, Psychiatry, Social Research, Mathematics, Information Systems, Medicine,	
The Institutional Repository	The author's interaction with IR system while submitting papers; The Author's observation of others using the IR system Author checking deposits in IR	IR project documentation Personal notes Submissions and usage statistics.

TABLE 4-3: SOURCES OF EMPIRICAL MATERIAL FOR JANUS UNIVERSITY

At Jupiter University I followed a similar process. Table 4.2 below similarly presents the ways in which the Jupiter University actors expressed themselves and the material traces that were used to conduct the analysis and description. Interviews were also verbatim transcribed, and observations and other notes recorded in a series of notebooks.

Actors from Jupiter University	Actors express themselves	Material traces
Repository Manager	3 Interviews 3 published papers Email and personal conversations	3 Interview transcripts The papers Conversations, notes, print outs
Deputy Vice Chancellor	1 Interview Published paper	1 Interview transcript
University Librarian	1 Interview	1 Interview transcript
OA Law Researcher	1 Interview	1 Interview transcript
RQF Implementer	1 Interview	1 Interview transcript
Active researchers from Business	1 Interview	1 Interview transcript, IR and SSRN deposits
Science	1 Interview	1 Interview transcript, IR deposits
Economics	1 Interview	1 Interview transcript, IR, SSRN and RePEC deposits
Education (2)	2 Interviews	2 Interview transcripts, IR deposits
Law (3)	3 Interviews	3 Interview transcripts, 2 IR deposits, OA LAW Research Centre and publications
Mathematics	1 Interview (by email)	1 email transcript

Inform'n Management	1 Interview	1 Interview transcript, IR Deposits
Design	1 Interview	1 Interview transcript, IR Deposits
Peace and Conflict Studies	1 Interview	1 Interview transcript, IR Deposits
Avionics	1 Interview	1 Interview transcript, IR Deposits
University community	Policies, articles	OA policy documents, other policy documents, and published articles, rewarding IR deposit, rewarding some types of publishing and not others.
The Institutional Repository	The author's interaction with IR system as a user; The Author's observation of others using the IR system	IR Interface, usage statistics.

TABLE 4-4: SOURCES OF EMPIRICAL MATERIAL FOR JUPITER UNIVERSITY

Finally there were sources of empirical material that informed the research into both universities. OA and institutional repositories, and the actors that have relations with them are not just within the boundaries of the universities implementing them. Accordingly this research draws upon a broad range of empirical material from beyond the two field sites. These sources are documented in Table 4.3.

Actors common to both cases	Actors express themselves	Material traces
OA activists	Publications from the OA movement, conversations and discussions on e-lists, blogs, wikis, web sites etc.	Articles, conference papers, conferences and workshops, open source repository software, web sites, blogs, wikis, electronic discussion lists (Bibliography and Appendix 1)
OA vision	Through activists and OA implementations	Increasing OA repositories, Funder and institutional policies (mandates), OA organisations (e.g. SPARC)
Journal publishers, journals and conferences	Policies, arguments	E-lists, publications, journal policies
Research Funders	OA Policies	Written, communicated policies, rewarding certain types of publishing, journal rankings lists

Disciplinary communities	Disciplinary repositories (e.g. SSRN, arXiv, REPEC), disciplinary journals and conferences,	Performance of disciplinary publishing norms by researchers, journal rankings lists
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TABLE 4-5: SOURCES OF EMPIRICAL MATERIAL FOR BOTH CASES

An assumption of this study is that following the actors involved in scholarly publishing and the IR implementations will “render the social connections traceable” (Latour, 2005: p. 31) and that some actors in scholarly publishing make other actors do things by “generating transformations” (Latour, 2005: p. 122). The proposed research aims to follow those transformations, or lack of transformation.

4.2.3 ANALYSIS OF THE EMPIRICAL MATERIAL

I started with traditional qualitative methods. A thematic approach was used to analyse the material traces of the actors expressing themselves. The aim was to identify themes within the data inductively. Themes that arose were sorted and resorted as the analysis progressed (Ezzy 2004). While I was interested in a particular set of issues and was informed by existing theoretical concepts and theories (particularly those emanating from other ANT works), I did not predetermine themes or categories prior to the analysis. I was looking generally for insight into how OA and IR might be going about reassembling scholarly publishing and what the consequences might be. I looked at the actors striving to establish OA IR, in Latour’s terms those striving to make OA IR a fact, and at those striving to make them less of a fact (Latour, 1987). However, I also tried to keep my mind open for surprises. This analysis occurred concurrently with my writing. Sometimes the very act of writing enabled the story within the empirical material to be enacted.

Each document and transcript was printed and read two or three times to gain an overall picture of the materials. There is a vast amount of material only a small proportion of which can be presented here. Following the ANT tradition I was seeking to allow the actors to express themselves:

For us, ANT was simply another way at being faithful to the insight of ethno methodology: actors know what they do and we have to learn from them not only what they do, but how and why they do it. It is us, the social scientists, who lack the knowledge of what they do, and not they who are missing the explanation of why they are unwittingly manipulated by forces exterior to themselves and known to the social scientist’s powerful gaze and methods. (Latour, 1999: p. 19)

Doing so was difficult. Each actor had a similar but different story to tell about how they pictured the networks of scholarly publishing, OA and IR. Putting their stories together into one thesis was difficult. One strategy was to write conference papers to discuss findings and to discuss aspects of ongoing work with colleagues and interviewees to see if my findings resonated with those in the field. Inevitably some of my findings resonated with some people and some with others.

As my analysis progressed so did my questions. How can non-human actors express themselves? How are researchers to represent their expressions? Non-human actors “speak” through representatives such as policies, statements, inscriptions (Pouloudi & Whitley, 2000) and as social actors speak about technological actors we learn something about them both. We can watch how technology interacts and we can substantiate these claims from other “speaking” actors (Hosein, 2003). In working out what non-human actors do I also followed Latour’s advice of imagining what other actors would have to do to maintain durability of networks, were this actor not present (Latour, 1992). In performing the analysis, I was therefore conscious of giving voice as much as possible to the actors both human and non-human. This has led to a large number of quotes in the assemblage of the thesis, to which I hope the reader is tolerant.

While conscious of the formal requirements of traditional research methods (Walsham, 1995b; Klein & Myers, 1999; Mingers, 2001; Hoyle et al., 2002; Neuman, 2003) I was also conscious that in the process of selecting what to include I was also selecting what would be absent from my account. Law (2004) suggests that the researcher has his or her own sense of what might or might not be important, and that this sense informs their argument. He suggests that as part of making and condensing realities the researcher crafts complexities and simplifications – “method assemblages”. Method assemblage is the process of enacting or crafting relations to depict the phenomena under study. In Law’s usage method is “not a set of procedures for reporting on a given reality” rather method enacts; it is performative, crafted from realities that are already being enacted. What I have done in these terms is to re-work, re-craft and re-create these realities into a report of what I think is important in the following chapters.

4.2.4 WRITING UP

Writing in ANT is a part of the method assemblage. It is not a report on a set of stabilized findings, but a process undergoing translation in its own right (Austrin & Farnsworth, 2005). Latour (2005: p. 127) suggests that textual accounts are the social scientist’s laboratory, that

the writing up of research adds an additional source of uncertainty, and that textual accounts can fail as experiments do. A text can extend the exploration of social connections, in Latour's words, if "the social is a trace it can be retraced, if it is an assembly it can be reassembled". Accordingly actors themselves in the area proposed for study, have been offered texts in various iterations, to assess the relevance of the research (Latour, 2005: p. 133). As ANT's aim is to record, not to filter out, to describe, not to discipline (Latour, 2005:55) the writing up may be messy; may, rather than reporting a singular truth or multiple interpretations of truth, report a messy multiplicity of fractional truths.

Constructing the text from the empirical materials has been a challenge. Whose narrative is privileged? How does one make the many disparate voices heard? The author inevitably takes responsibility for this narrative, and it reflects my sense-making process (Scott & Wagner, 2003), my attempt at the material operation of creating orders (Latour & Woolgar, 1986). Latour suggests that "if your description needs an explanation, it's not a good description" (Latour, 2004: p.67). So much of this thesis comprises description; the literature review and the findings particularly.

However, in recognition of the hurdles required by the presentation of a thesis an explanation is offered in Chapter 7. However, it is recognized that the explanation itself is a new actor, which must in ANT terms "make a difference" – a tall order.

4.2.5 METHODS OF ACHIEVING VALIDITY AND RELIABILITY

The proposed study is situated in a field study comprised of two cases and even actors beyond the boundaries of the cases. Statistical sampling based generalisability is not possible (Lee & Baskerville, 2003; Gorman & Clayton, 2005), nor is it compatible with the ANT methodology. Qualitative data collection techniques were employed, such as observation, interviews, participation, document analysis and thematic analysis. These cannot be used to demonstrate a fixed correspondence between a carefully defined abstract concept and a precisely calibrated measure. Instead generalization can be made to contribute towards the development of concepts, generation of theory, drawing of specific implications and contribution of rich insight (Walsham, 1995b; Walsham, 2006). Reliability will be demonstrated with rich descriptions of empirical data from the multiple sources (Neuman, 2003). The research will be reporting on different dimensions of the research questions in the context of the field setting. Similarly validity cannot be presented in the quantitative context; rather the focus will be authenticity of the presentation of the information from the cases, the hope that

the work will resonate with readers in the academic and scholarly publishing communities and those involved in the study.

In most research, the actors in the domain that is being researched who are not interviewed and who may disagree with the quotations and statements made by “their representatives” the actors who are interviewed, and the writer, are unlikely to be reading the articles, theses and other publications arising from the research. “They are immobilised by their absence” (Hardy et al., 2001: p. 545). In this case because the research is conducted in the wider domain of researchers, the only people who are likely to read the work arising from the research are other researchers. If the work presented here resonates with its readers, this resonance may provide authenticity or the chance for absent actors to voice their view.

4.3 LIMITATIONS

All research projects have limitations. This work is no exception. Although I was in the field for three years learning the craft of a researcher and following the trajectories of scholarly publishing OA and IR, most of the human actors were only interviewed once or twice. Their views are thus represented for a particular point in time, a snapshot. Scholarly publishing, OA and IR are ongoing projects and actors’ views may change, indeed may have changed since interviews, observations and analysis were conducted.

A number of works point to the methodological difficulties with ANT analysis (Underwood, 1998; Underwood, 2001; Orlikowski & Scott, 2008). How does the researcher actually trace the network and describe it. How do we allow non-human and human actors to speak? I have explained the process I undertook in this Chapter, but I acknowledge that I was learning as I went and I would do many things differently were I to begin now. However, I always aimed to trace the connections between controversies and render the connections traceable (with this written account) (Latour 2005).

4.4 ETHICAL ISSUES

The study was conducted with the consent of the organisations concerned, the individuals associated with the projects and the individual interviewees. Permission was sought and granted from the Faculty Ethics Committee. The Ethics approval number for Janus University is 06623 and for Jupiter University it is 07637.

Ethics approval required written consent for each interviewee. Prior to each interview, the actor was given a standard written form which provided a summary of the aims of the project, a space for their signature of consent and information about how they could revoke consent should they so require. As most interviewees were very familiar with the research process most did not require any further information and none revoked their consent. Where further information was required I provided it. Case materials are stored securely and rendered anonymous. Human and organisation actors are provided with pseudonyms, although it is recognised that anyone familiar with the OA and IR landscape in Australia may be able to identify the universities concerned.

4.5 CHAPTER CONCLUSIONS

This Chapter has presented the ontological and epistemological assumptions I have brought to this study by adapting ANT as my approach. I have explained how my understanding of ANT has informed the way I have gone about my research, analysis and writing in using ANT to inform both my theoretical understanding and my research methodology. The next Chapter will introduce the actors present in both cases and present some of the story unfolding to answer the research questions.

CHAPTER 5

5 THE ACTORS - A STRETCH OF THE IMAGINATION

To understand how and why open access (OA) is contributing to the reassembling of scholarly publishing, and what role the introduction of an OA institutional repository (IR) may play in this reassembling; we need to first meet the actors, to understand a little about how they act, how they relate, in this world of scholarly publishing. The actors here are those who feature in both cases. Those actors with a role specifically in one case or the other will be introduced as we discuss that case. I would like to thank Porsander (2005) for sharing the idea that we may give collective and non-human actors a voice of their own, that they may tell their own story. Where these actors are not human there is some criticism of this approach as a kind of anthropomorphism; however Latour (1992) suggests the non-human actor is made by humans, substitutes for the actions of humans and shapes human action by its affordances. Thus they act. How we write about their actions, their agency, how we allow them to speak is moot. Here I experiment with method assemblage, crafting and bundling (Law 2004) what I have learned about and from actors into depictions that generate their presence.

5.1 RESEARCHERS

We are one, but we are many. We are similar, but we are different. We are individuals, but we are also a group. We all do research and then write it up to communicate it. Why do research at all if you are not going to share the results? Publishing, for most of us, is the preferred option for sharing or communicating our results.

It's a part of my philosophy if you like that the work is not completed until the work is written up and published. There is no point in doing any research whatsoever unless the works get published. I think it's very important to do a block of work and then to write it up and tell the rest of the world about it. I think the whole world of science depends on communication; it depends on communicating either through conferences, through personal communication, but much more importantly, through publication. ... Anything that my students do or anything that my research assistants do or my colleagues do, we have to publish it [Professor Chemistry – Jupiter University].

It's research and dissemination of ideas and knowledge and the most important thing for us is to be read and to have those views considered by others whether positively or negatively or critiqued or what. So for us access and dissemination is critical [Professor Law – Jupiter University].

Philosophically the reason one publishes is that part of the whole process of doing science, which is what I consider research to be, is the dissemination of ideas, the

communication of ideas. So you do your research and you really want to try and influence a field by discoveries or conclusions that you have, so you publish and that gets your information out there and contributes to the academic debate that characterizes your field [Professor Education – Jupiter University].

... You have got some knowledge that you think is useful in a professional and scholarly area and you want other people to be aware of it. I don't have a strong imperative to tell people about things though or to tell people that I have discovered things. I don't think I discover anything terrific, you know, there is no theory of relativity stuff here. But I don't think I am particularly unusual in that respect. I think that applies in the majority of academia and a lot of this kind of reconstruction of knowledge [Senior Lecturer – Information Systems].

While we all like to publish, not all of us have the same motivation. Why do the research that leads to publication? Some of us are driven by interest in and excitement about the areas in which we work. This is what keeps us in the “system”. We have an *innate interest* [Professor Economics – Jupiter University] or we are *curiosity driven* [Professor Business – Jupiter University].

Most of the research that I do is unfunded research and I do it because I'm interested in it so I pursue it [Senior Lecturer Adult Education – Jupiter University].

I love scholarship ... academics worth their salt is getting their ideas in front of other people and yes you can do it now via the web, you can go to conferences, you can teach students, you can have PhD students and you can publish ... [Professor Economics – Janus University].

We do an “apprenticeship” writing and researching during and from our Ph.D. work.

... first motivation would be to really get your research out there so that others know what you're doing and it's less of a chance of someone else doing work that is conflicting with yours. It's also to get feedback from other people outside of the university and also because supervisors really push it. And my supervisor for example, sees papers, or uses papers as milestones in research. His justification is that ... you don't really get much work done unless you are working towards a goal of say a paper. So generally your research is from paper to paper and that work that you do for that paper would probably have taken twice as long if you didn't have a paper to write and a deadline. I find that's probably true [Research Student Avionics – Jupiter University].

Sometimes we publish to establish an intellectual claim on an area. We want to flag our rights to be working in a particular area, for having a particular set of thoughts, so we want our work to be published quickly.

I make all my students both Masters and PhD publish as they go along. If you hold it up, somebody else is doing similar work and they will publish it and then you miss out. To me, it's extremely important to publish as fast as you can go, whether it's right or wrong. You might want to change your mind later or you might have a different model or a different point of view, so it's much better if you publish [Professor Chemistry – Jupiter University].

I want to get my work out there because it's kind of obscure ... [subject area] I have Google searches going on every couple of weeks, and it always comes back with something or somebody talking about it, somebody advertising with it, or somebody, you know – and nobody really knows exactly what it is and what it means, and I've spent all this time researching it, so one of my aims is to try and get it out there so that people don't do it themselves and claim it was them. Part of it is just wanting to say, okay, this is my work; this is what I did. I did it before anybody else had actually looked at it in any kind of even approaching a scientific way. So you should all be citing me. So part of it is that. I've kind of spent my claim, I guess [Lecturer Design – Jupiter University].

But as I said, while we are one, we are also many. We have many other different reasons for wanting to publish our work. Some we share, some are ours alone. It may be for personal affirmation:

I think there's that gorgeous sense of affirmation that your peers actually think you've actually done something special {Senior Lecturer Law b – Jupiter University}.

Some of us like to think we have an influence on the discipline or practice, or it may be to promote a certain belief or cause, or to publicize a certain result. Some of us wish to have an influence over practice and recognise the difficulty practitioners have in accessing the scholarly corpus.

That's one of the reasons ... You actually write for yourself and to a certain extent you write because things need to be said. So that's a personal thing. It's a professional thing where people can actually recognize that you're a thinker, that's you've got ideas down. They go, you know, those articles have been quite good. So that's the personal and that's the professional [Lecturer Peace and Conflict Studies – Jupiter University].

... It's just really a wonderful feeling to see that it's, that your work is seen as important enough to be published and that others recognize it. ... So that's good affirmation. Another reason is to have some influence over practice What else? And I like the fact that you can be autonomous. ... I do research in areas that might be seen a little bit out of my field. ... So that's great. So that I can – when I write a paper think about maybe broadening my understandings and so forth. So yeah, the autonomy of being able to choose what you want to write is really great and that I can decide to go to the library and be there all day if I want and just read books and get ideas for papers. Although it's harder to do that with all the other work pressures on me and others of course. But yeah, just the ability to have some opportunity to create and to write something in a particular area that takes my fancy. That's a great privilege [Senior Lecturer Adult Education – Jupiter University].

Some of us harbour less noble, but none-the-less compelling reasons for publishing. We recognise the “publish or perish” phenomenon, the requirement to publish to secure work and promotion as an academic.

Realistically, I'm not a particularly good writer, so although I've got a good number of publications, I still struggle with writing, and I always feel it's not ready to go yet, I want to do another five years of research on this topic before I'll publish it. But the

pragmatics are that you work in an institution, and you work for an organisation where your measures of productivity are the number of papers you publish and the quality of those papers. So you tend to push papers out to meet those requirements. I can justify why I publish, but then the pragmatic short term, the needs of survival, actually drive the agenda [Professor Education – Jupiter University].

I wouldn't have done it nearly as much of it if it hadn't been a work imperative, something you had to do in relation to work. That you had to provide outputs in relation to the inputs you were getting [Senior Lecturer Information Management– Jupiter University].

For some of us “publish or perish” is a form of competition. For others it provides a pressure to publish in journals with an ISI impact factor or on a disciplinary list of ranked titles for the prestige or as a result of research evaluation exercises.

Just today I submitted a paper to an impact factor journal on older learners. It's a journal called Learning and Instruction which is – which has got an impact factor, which is something that I haven't really worried about in the past... [Senior Lecturer Adult Education – Jupiter University].

Sometimes it not only influences our choice of a journal in which to publish, and therefore but also the choice of research topic:

... When I say that it dictates the kind of thing you write about is that you know which areas are very, very sensitive and what kind of arguments would be very, very sensitive and those you tend not to put in articles at all. You might write books about them which are also hard to publish but the normal course of events is that you either write those as opinion pieces on your website or you wait until you're well and truly famous enough so that you're allowed to actually say it in your articles. But you basically skate around the hot potatoes [Professor Economics – Jupiter University].

... We write papers on particular topics which are hopefully at the forefront of our discipline and then we send those off to journals who have them peer reviewed [Professor Economics – Janus University].

Researchers want to do research. It is becoming increasingly important to “win” grants to fund future research. Publications, their quality and quantity, contribute towards our success at grant application.

Because the reviewers for grants are looking at the publications in seeing where you are publishing and are they quality publications. And if you look at it for grant applications 30% of the ranking is coming on the reputation of the researcher ... oh they've got a MIS Quarterly, they've got an IEEE Transactions, they've got a ISJ, they've got a whatever. Oh yes that's a good journal for that particular style of research but it has to be for that style of research [Professor Information Systems – Janus University].

Compellingly we also have an obligation to publish, to make our research accessible:

... We also have an obligation in relation to the people that fund our research that we make – what we find accessible to others and a range of reasons {Professor Business – Jupiter University}.

We have a range of reasons for publishing, and were there space and time for more of us to be heard here, there would no doubt be more reasons. We are one, but we are also many.

As we write papers, we also act as peer reviewers for papers and editors of the journals and conferences in which we publish.

5.2 PAPERS

We are also one but many. And we take different forms. We may be journal articles, conference papers, book chapters. We may be written on paper or in electronic form or both. We may be MS Word, LaTeX, pdf or HTML. We are born from the writing up of research projects, or the thinking and theorising of our authors. We may be distributed in journals, books, proceedings, via the Internet, e-mail, web blogs, repositories, in pre-print, post-print, re-print.

We are often written by scholars, for scholars in a way that is inaccessible for one reason or another to practitioners or patients or other “outsiders”. Many of us contain arcane disciplinary language, complex theoretical approaches and focus on methodological issues.

There is also a maturing field of business studies in general and especially in my area which is a young area. So it is becoming more like a discipline. It is becoming more methodologically and theoretically sophisticated and therefore the outputs that we produce to impress each other become increasingly inaccessible for the practitioner. So you would need to have different forms of output for those different audiences [Business Professor – Jupiter University].

Sometimes our authors resolve this by rewriting us in a more accessible way for a professional journal and sometimes we live our lives inaccessible to the general reader. We can also experience difficulties in getting published at all. Sometimes our content is cross disciplinary or in a new and emerging field and no specific journal is right for us.

... My area is very sort of cross-disciplinary... I guess one is that there aren't very many journals anyway. There's one traditional journal which is the one that I've had my own paper in – Design Studies. That's probably the longest established; then there's Design Issues which is also quite well respected. And then after that, you get to really minor ones. So those are pretty much the only two, and then you're talking about going to all sorts of other little niche publications all over the place {Lecturer Design – Jupiter University}.

Or sometimes we are written in a new subfield that can't get published in a traditional journal so a new journal is established to support it.

we're heading for a journal that's very relevant, very new so it doesn't have an ISI listing but if you like I was one of the people who said let's go for it because of where it is. Interestingly enough {other authors} were almost ready to reject it on the basis it didn't have ISI listing. So you can see the impact starting to occur elsewhere. So you've got to look where it's going. And you look at the strength of the paper you are producing and the audience you are trying to hit [Professor Information Systems – Janus University].

Sometimes we are published in high impact journals, sometimes in a lesser one; sometimes in a local journal for a small but specific audience, sometimes an international journal aimed at a wide audience. Sometimes we are something on the way to being something else: A conference paper on the way to being a journal article, a journal article on the way to being a thesis or a book. We are not all equal. Our authors and readers rank us:

If you're lucky it gets into a top journal or if you're less lucky you go down the food chain and get into the second or third tier journal [Professor Economics – Jupiter University].

Sometimes we are very unlucky and we don't get published at all. But we all have the same aim, to be published and to be read, to add to the scholarly corpus, to be cited and not to languish in the dark.

5.3 PEER REVIEW

I am peer review. I am also sometimes called refereeing. I decide which papers get into journals, conference proceedings and research books. I am usually performed by a group of experts who read papers and perform an impartial review of the paper, its method and contribution. I am considered to be essential to ensuring that published papers reach standards of academic rigor and quality. Reviewers are typically anonymous and independent. There is a perception that when I am performed blind or especially double blind the paper is more likely to receive an unbiased and serious review. Researchers appreciate the feedback I provide them, the honest and constructive feedback that enables personal improvement, the *quid pro quo* nature of refereeing and being refereed. You can see how researchers appreciate me from the statements they make about me:

The other thing that I'm a great believer in is with publications, that the publications be reviewed and refereed, because we have to maintain some sort of quality of publication and that can only be done through peer review process [Professor Chemistry – Jupiter University].

Yes, and the more rigorous the process is, the better. The ones that I've just had ... – this online one, actually – there were some negative comments in there, but one of those papers is really a summary of a lot of the results I have from my PhD, so there are things in there that went through my thesis fine, that people picked up, and said, 'Oh,

how about this or that?’ but hadn’t been picked up by the examiners [Lecturer Design – Jupiter University].

Probably the good thing is that, by and large, you do tend to get honest feedback on your publications, on your submissions. I’ve been mostly fortunate in that, even when papers have been rejected, I’ve had two or three pages of comments on the material. So, colleagues put a lot of energy and effort into reviewing other colleagues’ papers, even if they don’t like them. So I think that’s been useful. If I give a paper to the person in the office next door, they’re less likely to give me honest feedback because they know they’ve got to meet me in the corridor, so you don’t get that level of feedback unless you’ve got a really good friend who will do it in a nice way. Whereas, with the reviewing process, people don’t have any reason to hold back. They don’t know who you are, generally, and of course you don’t know who they are, so you get honest evaluation [Professor Education – Jupiter University].

Knowing that I’m doing that for other people as well is good for them but also it’s kind of need to go, okay, how good is my scholarship to be able to know that I can referee this article. So it’s got that nice circular thing and if people think you’re good enough to referee as well, it’s like another affirmation so if someone says I’m going to get you to referee this, will you do this...[Senior Lecturer Law – Jupiter University].

I am not without my critics. Some researchers express concern regarding the formation of cliques and hierarchies that are difficult to break into or overcome. Personality and intellectual cliques can override peer review purely on merit, because although peer review is often “double blind” many fields are small enough that a person can be recognized by the nature of their contribution. Where review is not double blind these concerns are even more evident.

I guess the downside of that is if you do get knocked back it can – and if you don’t agree with the referee’s comments you have to be robust about that and you also have to be committed to your own ability to know that sometimes – well, as a professor in a different school once said to me that he got great pleasure out of giving people a hard time through the referee [coughing][Senior Lecturer Law a – Jupiter University].

But I know one person who reviews [...] who just wouldn’t get back and I had a nasty feeling that what they were doing was holding off refereeing so they would get – they would use this person’s stuff to write and that really, really – I think some referees do that [Senior Lecturer Law b – Jupiter University].

...that it’s too much of a buddy system, and also it’s the idea of success breeds success, once you’ve published in a journal you’re more likely to be, to have another paper published in it [Associate Professor Information Management – Janus University].

Another criticism made of me is the time that I take through out the whole process:

One particular journal, I’ve actually moved away from that journal. I’ve published a lot in the journal before, but because they’re so slow, I try to publish papers in other journals since that time. ... Slow is well over a year before you can get something published [Professor Chemistry – Jupiter University].

Well the time lags. It takes so long until you see your work in print. You have probably lost interest in that project by that time and you are working on something else. ...

From first submission to seeing it in print, usually three years. Quite often three years. So I mean that's way too long [Professor Business – Jupiter University].

Concerns of timeliness. In some of the journals I publish in, and some of the articles I've published, it's taken three years in turnaround, from the day the paper was submitted; things had to be changed. In one particular article, it came out earlier this year; I think it was submitted in about 2004. It's almost out of date by the time it hit the journal. That's a down side. That's not the case in all fields, but certainly in education [Professor Education – Jupiter University].

5.4 JOURNALS

We are scholarly journals; that is we publish papers that are peer reviewed and relate to a particular academic discipline, field or sub-field. Academic or professional publications that take papers that are not peer-reviewed are usually called professional journals or magazines. While we have many similarities, we also have many differences. We will talk here about the things we have in common, but you the reader, need to be aware that differences also apply between disciplines and sometimes even countries or cultures.

Authors submit their papers to us. Journal editors read it to see if the paper warrants further peer review or refereeing to assess whether it meets our criteria. In most fields we are ranked sometimes quantitatively and sometimes qualitatively, sometimes formally, sometimes informally. We are published by publishers who are sometimes commercial and seek to make a profit, and sometimes scholarly or scientific which also seek to make a profit, or even sometimes subsidize us. Sometimes when we are published by a scientific or learned society researchers prefer us, partially because the editorial services are essentially provided by the society and therefore provide confidence in the integrity of the editorial systems and it provides an opportunity to a society and partially because

... faced with the choice of supporting scientific societies or enriching [Publisher], then I go to the ones that are still published by scientific societies [Professor Plant Ecology – Janus University].

Researchers can be very strategic about selecting journals or conferences in which to publish their work on carefully considered criteria. Established authors understand the complex relations between we journals in their field, and the differentiations of ranking and reputation. However, some think it is important, especially at the beginning of an academic career to just get published anywhere:

There are alternatives to strategies because it is really important as a young academic to get published even if not published well. So especially young academics now and then immediately start at the level they think it will eventually get published anyway in

order to get as they would call it runs on the board [Economics Professor – Jupiter University]

Others believe that publishing “anywhere” is not really an option even at the beginning of one’s publishing career:

And I think that is the competition amongst us is to be published a lot but that’s not even good enough to be published a lot, it’s published well [Senior Lecturer Law a – Jupiter University].

Some begin the selection of the journal before they even commence writing up or even occasionally before they commence their research. While writing they take into account previous work published in the journal and they make their own work sound as if it is “a fit”.

...you know which of the top journals are interested in which fields because you can see what they’ve published in the recent past and so you write your article specifically for that journal. You make sure you reference the people who have published in that journal and make it sound as if it is very much in that particular area. Then you send it off there and if they reject it well you have to slightly rewrite it because you then have to send it to another journal. But within an area you roughly know which top journals might be open to your work and which are not. ... But I would say that this strategy of top down is the normal approach [Professor Economics – Jupiter University].

Different researchers have different approaches in their relations with us. Some strategically target a wide range of journals to give a wider audience, wider possibility of citation and to lessen their chance of rejection.

I actually try to publish in wide a range of journals as possible to get a bigger audience. I don’t like to have too many papers being submitted to one particular journal at once, because it gives them more of an opportunity to reject some of the papers, so I like to spread them out as much as possible. That way, I think you can reach a bigger audience or a wider audience and people will notice your work more and hopefully they will cite your work too, which I think is very important as well [Professor Chemistry – Jupiter University].

Each of us aims for a different audience. Our audiences may be researchers’ academic peers, specific fields and sub-fields within disciplines, practitioners, students, even the interested lay-person. Place of publication can also influence our relations with authors. For example, publishing in Australian journals is seen as potentially limiting readership. Similarly Australian journals are generally not seen to have the ranking or reputation achieved by publishing in international journals. However, for some their research is specifically about Australia, for example, Australian eco-systems or aspects of Australian law. These researchers in many ways are forced to publish in Australian journals which as several authors point out;

...gets me into conflict in a sense with the university’s corporate objectives these days [Professor, Plant Ecology – Janus University].

In choosing a journal to submit their paper to, researchers in effect choose different audiences. Thus we are often carefully chosen.

... Usually I'm really strategic. I'll know where I'm going to send the paper before it's written. So I have an idea so that when I write it I'm writing it for a particular audience. So I'm writing it for this journal... But usually it's the focus of the paper {that determines where I publish it} [Senior Lecturer Adult Education – Jupiter University].

Over my period of publishing, I've been publishing for 20 years or thereabouts, I've tended to target international journals in preference to national journals, and even if I go to conferences, I work on the principle of having a paper fully prepared. It may not be a refereed conference ... but there's always an intention to turn that conference paper into a journal article and submit it to a good quality journal publication [Professor Education – Jupiter University].

When it comes to publishing we sit down and try and list the appropriate publications always aiming for top journals, internationally refereed journals. Generally I insist or say that it's important to get into an ISI type of journal. If we can't do that, at least get into something that's refereed, hopefully international ... [Associate Professor Information Management – Janus University]]

Another audience issue for scholars in fields with a high incidence of applied research, or research which could be of interest to practitioners is whether to publish for a practitioner audience. Most practitioner journals don't make disciplinary ranking lists, feature in ISI or "count" for the HERDC reporting. So when researchers choose to publish in our cousins, professional journals or other non-peer reviewed journals they make a trade off.

Then of course the topic of the work; whether it is a more purely scholarly contribution or if it is more practice orientated. Sometimes you publish different works based on the same thing for different audiences... So as an applied field we should really be close to practice. But then of course scholars want to be scholars and the nature of the academic incentive system pushes you that way as well. So that what counts is sort of scholarly publication in order to impress other scholars? ... [Professor Business – Jupiter University].

Sometimes I write articles for professional journals, cos I think that's really important because after all I think most people, or more people would read a professional journal than they would an esoteric journal with an impact factor unless you're a student or you're studying in that field... because I think it's important to share the findings of research with the practitioners and that idea of the research practice nexus, which I think is so important. Our research should be for a purpose [Senior Lecturer Adult Education – Jupiter University].

One interviewee mentioned that wherever possible he would select a journal published by a scientific or learned society as a publication outlet, partially because the editorial services are essentially provided by the society and therefore provide confidence in the integrity of the editorial systems and it provides an opportunity to a society and partially because

... Faced with the choice of supporting scientific societies or enriching Elsevier, then I go to the ones that are still published by scientific societies [Professor, Plant Ecology].

5.5 CONFERENCE PROCEEDINGS

Like journals we publish papers that relate to a particular academic discipline, field or sub-field. However, we are not always peer-reviewed. Sometimes a paper published in one of us is on its way somewhere else, to become a journal article or a book chapter.

Some researchers may prefer writing for us to writing for journals as we offer different benefits for a paper. If a paper is delivered at a conference the researcher can immediate feedback in the question sessions, but also because often we are easier to get in to and provide chances for meeting and networking with future colleagues and collaborators.

Okay, I think the most useful thing is actually presenting at the conference with the question and answer time at the conference itself. Because a lot of the conferences in my area are not particularly well peer reviewed even if they are – it may just be formatting style things and not an in-depth technical review by experts in the field. Especially for conferences in Australia because there are just so many papers to get through and there's only a limited number of experts in that area. So I think journals for that matter would go through more, go through a more rigorous review process so they – to get your research peer reviewed, a journals probably the best way to go or a presentation, a conference where you have question and answer time and discussion afterwards [Research Student Avionics – Jupiter University].

Many fields rank us as they rank journals, but sometimes it is extraneous matters such as the location, availability or lack of funding, disciplinary networking demands and other decisions that can lead authors to want to go to a conference and almost as a side effect to publish in the proceedings.

And conferences is just a question of – well, its opportunity based really, what comes up. Often with conferences with me, ..., it's what's closer to [location] or where I can afford to get to because I can't really go internationally at the moment and even somewhere like [other location] is a bit not on the cards for me. It has to be somewhere I can get to and back relatively fast [Senior Lecturer Law a – Jupiter University]

One for the conference you'd be looking at where you wanted to place it and who you wanted to see at that particular conference but secondly knowing and having been brought up on the philosophy that a conference publication isn't worth that much. [Professor Information Systems – Janus University].

In some fields conference papers are a less formal precursor to a journal article, almost like a working paper, whereby an aspect of a research project is presented and feedback from the conference audience is utilised to further develop either the paper or the project. In other

fields, conference papers are viewed as a legitimate form of research output on their own, and conference proceedings are formally published.

5.6 RESEARCH EVALUATION EXERCISES, HERDC, RQF, ERA

One of the reasons researchers are so strategic about selecting the journal or conference in which to publish their papers is because of me. I have even been blamed for the “publish or perish” syndrome.

The only comment I would make is that maybe RQF has changed our publishing a little bit, because since three years ago and they started to introduce this RQF scheme, I've actually made a concerted effort to try and publish in higher impact journals, but that's not a result of [Jupiter] ePrints, that's a result of RQF which is driving everybody mad around Australia, I think [Professor Chemistry – Jupiter University].

I have many facets. In Australia in addition to evaluating research within individual institutions for tenure and promotion, I have a national face. I am The Higher Education Research Data Collection (HERDC pronounced herdsee) (Australian Government Department of Education Employment and Workplace Relations, undated). Universities gather and submit data about research income and publications to me and on behalf of government funding bodies I utilise that data to assist in determining funding allocations to universities.

The Government was not been entirely happy with me and was developing a Research Quality Framework (RQF) with the objective to improve the evaluation of the quality and impact of publicly funded research and to design an effective process to achieve this (Australian Department of Education Science and Training, n.d.-b). In October 2006 a paper titled the *Recommended RQF* was released (Australian Department of Education Science and Training, Development Advisory Group of the RQF, 2006) which, as well as outlining the implementation methodology for a new research evaluation regime, the future RQF, also drew attention to the fact that the RQF was developed in conjunction with the Accessibility Framework (Australian Department of Education Science and Training, n.d.-a), and that projects supported through the Accessibility Framework such as Janus University's repository would therefore have a role to play as RQF Information Management Systems (pp.26-27). However, there was tension between the OA messages of the accessibility framework and my RQF's requirement for the official published version for evaluation.

An election on Saturday November 24, 2007 saw the Australian Federal Government change from a Liberal/National Coalition to a Labor majority. The current state of research assessment in Australia is that on the 24th December the new Labor

Government cancelled the RQF, and on the 28th February 2008 proposed its replacement; Excellence in Research Australia (ERA). The ERA is to be developed by the Australian Research Council (ARC) in conjunction with a new Department of Innovation, Industry, Science and Research (DIISR). It is proposed that the ERA will assess research using a combination of metrics and expert review conducted by Committees of experienced, internationally-recognised experts. As I write I am still under negotiation and development (Australian Government Australian Research Council, 2008).

Use repositories: umm well it will be part of the centralisation of the administration in terms of collecting the relevant publications and making sure they go to all the institutions that want them and which the RQF will be one. The RQF will be one of those clients if you like. From a central administration of publications I think that that is likely to happen but that was happening anyway over time. It might just speed it up slightly [Professor Economics – Jupiter University].

5.7 OPEN ACCESS

I am research and scholarship freely available over the Internet. I am partially enacted. Estimates vary between 11% (Björk et al., 2008) and 15% and 20% (Swan & Carr, 2008) of research and scholarly is openly accessible. Thus I am a vision, in the sense that I have the ability to conceive what might be attempted or achieved, what is possible. But I also have other qualities of a vision. I am a highly imaginative scheme or anticipation. I express some foresight (Oxford English Dictionary, 1989). I am explained by the Budapest OA Initiative thus:

By "OA" to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. 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 (Budapest Open Access Initiative, 2002).

The literature they refer to is:

... that which scholars give to the world without expectation of payment. Primarily, this category encompasses their peer-reviewed journal articles, but it also includes any unreviewed preprints that they might wish to put online for comment or to alert colleagues to important research findings (Budapest Open Access Initiative, 2002).

People see me in other ways, but this is the way in which I see myself.

5.8 INSTITUTIONAL REPOSITORIES

I am an institutional repository. I am an online archive. My role is to collect, preserve and make accessible the research output of the university. I rely on researchers to put their work into me, software developers to maintain and develop me, the systems guys to keep me running. And then I work with the Internet and search engines such as Google to distribute the work of my researchers to the world of information seekers. Some see my role as primarily to provide OA (Borgman, 2007), but others (for example the RQF above) find other roles for me.

5.9 GOOGLE, GOOGLE SCHOLAR AND OTHER SEARCH ENGINES

I am Google⁴³. I am a search engine; that is I am a set of programs that comprise an information retrieval system. Specifically I am a web search engine searching the World Wide Web. I am also Google Scholar, searching specifically the scholarly web. But I am more than that. I am so ubiquitous I have entered the lexicon. I was launched in 1998 and by 1999 I was already being used as a transitive verb to describe the very act of searching, as in “Did you Google it” (Simpson, 2008)?

Everybody uses me to find information, but they use me in different ways and for different reasons.

I use Google, but not for looking up scientific journals. I use Google - say I'm studying some mineral or something, I will put in the mineral in Google and look it up and see what it says. I use Google to locate titles of journals, but not for journal publications, no [Professor Chemistry – Jupiter University].

I use Google Scholar every day ... I use the library databases a lot as well. We have a fantastic coverage of journals in electronic form. I realise that. I think that if I were to find something on a specific topic rather I would probably use Google Scholar because it is so easy to use. What you will find would probably be good enough in the end, even if it is not perfect, it would be good enough [Professor Business – Jupiter University].

Either specialised databases, ProQuest or something or I simply just Google [Lecturer Peace and Conflict Studies – Jupiter University].

There is the temptation to regard me as a “boundary object” (Star & Griesemer, 1989), plastic enough to adapt to the local needs and constraints of all the parties employing me, but robust enough to maintain my own identity. However, reports from interviewees indicate that the way Google appears to users may in fact be “fluid” (Mol & Law, 1994; de Laet & Mol, 2000), a “mixture” inside of which everything informs everything else, for which there are no clear boundaries and multiple identities.

⁴³ <http://www.google.com.au/intl/en/about.html>

5.10 OPEN ARCHIVES INITIATIVE PROTOCOL FOR METADATA HARVESTING

The Open Archives Initiative⁴⁴ (OAI) develops and promotes interoperability standards that aim to facilitate the efficient dissemination of content. OAI has its roots in the OA and institutional repository movements. I am the OAI's Protocol for Metadata Harvesting (OAI-PMH). I was created to facilitate discovery of distributed resources. I am "a simple, yet powerful framework for metadata harvesting. Harvesters can incrementally gather records contained in OAI-PMH repositories and use them to create services covering the content of several repositories" (Van de Sompel et al., 2003). OAI-PMH could be used to provide federated searching, to enable papers deposited in institutional repositories to have their metadata exposed and be harvested by other repositories, for example disciplinary or subject repositories, and to enable exposure of more items from the "hidden web". The OAI-PMH URL is generally not publicly available, although like the repository home page URL it exists to make the content of the repository public. To make it so, may enable interesting research about the contents of various repositories and analysis of the state of repositories world wide.

5.11 CHAPTER CONCLUSIONS

In this Chapter key actors who appear in both the cases examined in this thesis and who exist in multiple networks associated with scholarly publishing, introduce themselves. In the next Chapter I will follow these and other actors at work on the introduction of institutional repositories in two institutions. It will examine how the IR projects enrolled actors within their universities, at what actors played a role in enrolment or anti-enrolment of other actors, at how enrolment was resisted or performed. In each case I will examine how [relatively] new actors to the publishing world, OA and IR, are seeking to shift the alliances of researchers from their traditional publishing practices to make their work openly accessible.

⁴⁴ <http://www.openarchives.org/>

CHAPTER 6

6 ACTOR NETWORKS AT WORK

This section of the thesis is about the introduction of institutional repositories in two institutions. It looks at how the IR projects enrolled actors within their universities, at what actors played a role in enrolment or anti-enrolment, at how enrolment was resisted or performed. It looks at how [relatively] new actors to the publishing world, OA and IR, are seeking to shift the alliances of researchers from their traditional publishing practices to make their work openly accessible.

6.1 JANUS UNIVERSITY

6.1.1 CREATION OF ALLIES, PROGRAMS OF TRANSLATION

Beginning

And what we call the beginning is often the end

And to make an end is to make a beginning

The end is where we start from

T.S. Eliot, *Gerontion*

Where to start this study? We shine a torch onto OA and IR and see what is illuminated by its ray of light. Then we can follow the illuminated actor and see what it and its connections can tell us. What does our light illuminate first? By accident of acquaintance and location at the end of 2005 my torch's light finds the University Librarian at Janus University. I, holding the torch and therefore not illuminated myself at this point in time, question him about the possibility of following the development of his repository. I am interested in how researchers perceive OA and institutional repositories, particularly in relation to their traditional publishing. His repository at this point in time is a research project rather than a repository entity. "By all means" says the University Librarian, "We will be interested to see what you find". "Where should I start?" I ask him. I have already taken a look at the literature; I feel I am up to speed on the published opinion and research on OA and IR at this point in time. "Well" he says, "For us the story began in 2003 when DEST [A Government Department] put out a call for expressions of interest". So I will begin with DEST.

I journeyed to The Department of Education, Science and Training's (DEST) web pages and there found a huge range of documents including reports and commissioned publications reporting a rich and interesting process of debate and development. DEST on behalf of the Australian Government identified research as one of its strategic policy priorities. It invested large amounts of funds in research and research infrastructure through recurrent funding and grants. In 2002 in a report to the Australian Government through DEST the Chief Scientist highlighted the importance of the accessibility and dissemination of research resulting from that funding and those grants (Batterham, 2002). So in a sense, the story begins before DEST, but I do not have access to that part of the story. I enter after the OA vision, through reports such as Batterham's and the continuing activity of researchers and OA activists discussing and promoting OA and IR in the higher education and research sectors world wide, have created an ally in DEST. Following the actors I find at the web site, reports, papers, press releases, descriptions of funded projects I have pieced together this story.

DEST is the Government Department that is responsible for assessing and funding the research produced by Australian universities. DEST is aware that changes in research practices and developments in technology are occurring and supports research projects that will provide input into thinking and planning for future development of research infrastructure. Some of this research comes down clearly in favour of developing systems, such as institutional repositories based on the principle of OA (Houghton et al., 2003). DEST, translated by the OA vision reported in these reports, meetings and publications, recognises the difficulties associated with the accessibility of research output and the importance of OA for research communication, collaboration, and the advancement of knowledge. As a result DEST explicitly proposes that:

...access to information is essential for research. In order to produce high quality research, researchers must have access to research data, including large specialized data sets, and to the products of research, including scholarly publications [Department web pages].

As research information and published research outputs are increasingly being produced in electronic form, opportunities appear to improve the access of researcher to information using information technologies such as OA IR. Also recognized is that doing so presents significant challenges, for example in the area of information access, management and preservation. The Department allocated funds on a competitive basis under its Accessibility Framework for the development of research information infrastructure including OA IR in universities.

Thus DEST, a macro-actor defines the problem - access to research for communication, collaboration and the advancement of knowledge, as well as the solution – the implementation of OA IR initiatives - as a way of solving problems of accessibility to research. Initially this refers specifically to research products such as scholarly publications, and to investigate some of the challenges such as information preservation and the management of research outputs.

The Department in 2003 established a Committee, the Australian Research Information Infrastructure Committee (ARIIC). ARIIC states that OA could contribute towards building informed communities and eliminating social and economic disadvantage. It therefore committed to the:

“building of infrastructure, such as institutional repositories which will advance OA”
(Australian Research Information Infrastructure Committee, n.d.).

To enrol universities to the OA IR network, DEST allocated funds for which universities could apply on a competitive basis. These funds were earmarked under its Accessibility Framework for the development of OA IR in Australian universities. The light from the torch thus lead me from the University Librarian, back to trace the history of the project through the inscriptions of the Government Department (Australian Department of Education Science and Training, 2002; Australian Department of Education Science and Training, 2003a; Australian Department of Education Science and Training, 2003b; Australian Department of Education Science and Training, n.d.-a; Australian Research Information Infrastructure Committee, n.d.), revealing the trajectory of the influences that lead the initiation of the OA IR network by allocating funds to universities.

How then does Janus University enter this world of OA? The Janus University Library has already been enrolled in the OA world for one particular type of research output. Janus University worked to create OA to research theses and dissertations and has developed a strong reputation in this area. The University Library is the delegate in this case for the University as a whole. The University Librarian of University A is interested in participating in the development of IR infrastructure and is made aware by the Government Department that the Department would prefer to fund collaborative approaches.

- *A key objective to this Initiative is to provide additional funding to upgrade the systemic research infrastructure or ‘overhead’ resources of universities to meet demonstrated needs in order to support world-class research and research training at Australian universities.*

- *Funding will be provided for innovative approaches to meet demonstrated needs which link or expand access to shared facilities, such as libraries, information and communications technologies, specialised equipment, introduce new initiatives, or further the adoption of common standards for the sector as a whole.*
- *It is expected that there will be a **significant degree of collaboration between universities** [my emphasis] to ensure the most effective use of the resources provided (Australian Department of Education Science and Training, 2002).*

She builds the consortium network by enrolling the Janus University Librarian, University B University Librarian and the National Library. They put together a Consortium, a proposal for OA IR development and an application for funds.

[The other University librarian] rang me and was interested in putting together a bid for what became [the Consortium]. Ours are organisations and libraries that have some similarities. We agreed to keep the project small. That we would involve [two other organisations]. The [Government Department] expression of interest ... it didn't constrict and restrict what you had to do but it did. It wasn't totally blue skies but there were certain things that they were wanting to do with the repositories. So in terms of what we were doing with the [existing projects], [the Consortium] seemed a good opportunity for us to try and work with other people. To expand our understanding of the issues involved in developing institutional repositories, the cultural issues, technical issues. So it was in many ways a happy intersection of partners and projects and goals [University Librarian].

The actors involved in the network building of the Consortium and the traces of the relations between them are illustrated in Figure 6-1.

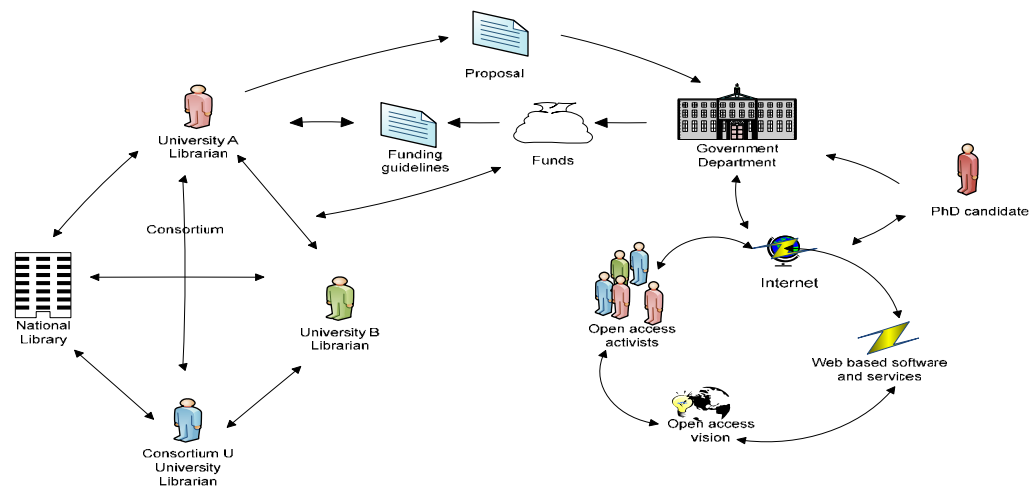


FIGURE 6-1: BEGINNING TO BUILD THE NETWORK

The Consortium is created and the Government funds are “won”. While the Government Department’s documentation refers specifically to the “*building of infrastructure, such as institutional repositories which will advance OA*” the Consortium’s documentation does not specifically refer to “OA” although it alludes to it:

[The Consortium] will identify and test and develop software solutions to demonstrate best practice solutions for storing and organising digital information such as e-prints, digital theses and electronic publications in institutional repositories. This will include development of a repository and the enabling metadata to support independent scholars as well as those associated with institutions [Project Documentation].

The consortium is a loose one. While collaborating on the software and other aspects, each University has different approaches to OA and IR. For example, Project Manager 2 indicates that one of the other members of the consortium is interested in OA publishing in OA journals. The National Library is interested in a resource discovery project. At Janus University the University Library sets up its IR project and appoints a Project Manager. The stated aims for the consortium are to:

... identify and test and develop software solutions to demonstrate best practice solutions for storing and organising digital information such as e-prints, digital theses and electronic publications in institutional repositories. This will include development of a repository and the enabling metadata to support independent scholars as well as those associated with institutions [Consortium documentation].

Why was Janus University interested in the OA IR funding? What role did it envisage the OA IR would play within the university? Again, no mention of OA, but “softer” terms such as “visibility and accessibility” As stated in the 2005-2006 Business Plan the:

IR @ [Janus University] will

- *Provide an infrastructure for the stewardship of digital research publications and collections in the long-term*
- *Increase the visibility and accessibility of [Janus University]researchers and research*
- *Capture, maintain and preserve [Janus University] research as part of the official record of intellectual output*
- *Increase the diversity of scholarly research that is captured, accessed and managed at [Janus University]*
- *Contribute to the reporting and measuring of [Janus University] research to the Department of Education, Science and Training*

In the literature we look at what researchers say are the benefits of OA IR: increased visibility and access to their research output, potentially increased citations, a freeing up of access to the largely publicly funded scholarly literature. But these are only one small aspect of Janus

University's plans for the IR, and no mention of an explicit OA vision is there: Visibility could mean just the metadata, not the actual research output.

The Consortium's joint project relied upon development of the IR technology from two software developers – an existing open-source database or repository software developer community and a commercial software developer for the user interface. The open-source database layer was chosen because of its demonstrated scalability; it was under active development and was perceived to have the extensibility and flexibility to accommodate a broad range of digital objects. A partnership with the commercial software developer for the development and maintenance of the self-submission and public interface layers was chosen to ensure sustainability beyond the project funding. The Consortium had some shared aims mainly centring on the software, its testing and development and some individual aims as illustrated in Figure 6-2

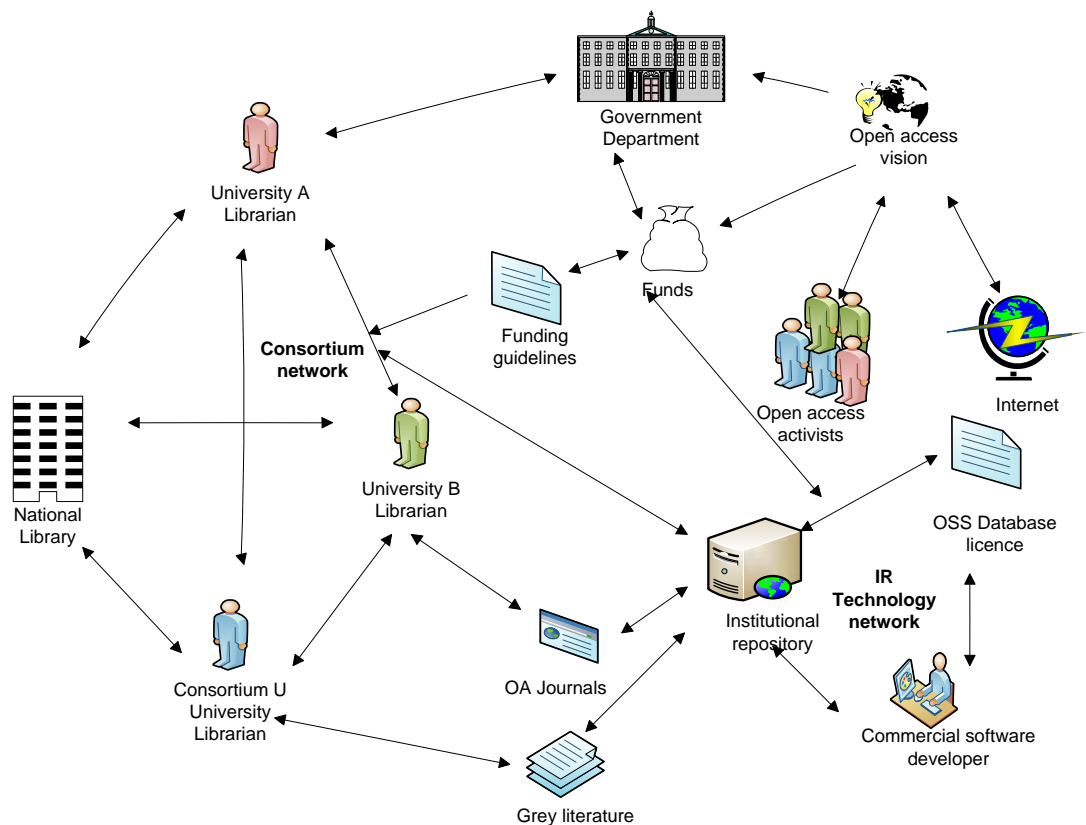


FIGURE 6-2: BUILDING THE IR NETWORK

Janus University's specific focus was to provide an OA IR that:

- *Created an information management service for the university's research,*
- *Achieved a critical mass of content*
- *Enhanced access to, and*
- *Increased the use of scholarly research output at Janus University.* [Janus University IR documentation]

The University Librarian can be seen as an initiator of the Janus University OA IR. The University Librarian also defines the program for other actors in Janus University and positions himself as a mediator. He delegated the implementation of technology of OA IR and its introduction to the university community to a Project Manager (three people held this role over the period studied) who worked within the infrastructure of the University Library overseen by himself. The project was viewed as a long term research project in interviews, while the project documentation talked of implementation and deployment and had a proposed timeline linked in with expectations from the funding sources. According to the original business plan the repository would be demonstrated in January to December 2005, deployed January to June 2006 and distributed and launched July to December 2006. However, hold ups in the development of the software and changes in staff meant that the OA IR was not officially launched until December 2007 with a soft launch to the Academic Board. There was no associated general announcement of the repository to the university community; however, outreach librarians assist in promulgating the repository and OA. Take up is slow.

Introducing myself – JanusWorks: an Institutional repository

When I began I did not have my own name, instead I was named after the Consortium that gave birth to me⁴⁵. When they were ready to announce me to the world, they held a competition to find a name for me. You can call me JanusWorks. I am built on Fedora, a free and open source robust integrated repository-centred platform that enables the storage, access and management of virtually any kind of digital content. The name Fedora comes from Flexible Extensible Digital Object and Repository Architecture but I am both a software platform and an architecture⁴⁶. I like the idea of being free and open source, as it merges with my role of providing free and OA to the research output of my university. I began as a research project at Cornell University. At the time my story begins at Janus University Fedora was a

⁴⁵ I would like to thank PORSANDER L (2005) "My Name is Lifebuoy": An Actor-Network Emerging from Action-net. In *Actor-Network Theory and Organizing* (CZARNIAWSKA B and HERNES T, Eds), pp 14–30, Copenhagen Business School Press, Copenhagen. for helping me learn how to speak.

⁴⁶ <http://www.fedora-commons.org/>

repository engine, with deep and rich functionality (Payette & Lagoze, 1998; Payette et al., 1999). But it did not provide an out-of-the-box experience. If the Consortium downloaded Fedora only, all they would have was the engine. To do something useful with me, someone had to write software (Treloar, 2005).

For many reasons from the practical to the philosophical, the Consortium chose to go with a commercial software developer that already had worked at developing the beginnings of a web front end and a Windows based management system for me. As a part of the deal the Consortium would have the ability to influence the direction of future versions of the software, as well as getting access to pre-beta code for testing and critiquing me. Further, as a condition of funding any software developed would have to be available open source. There were many software developments we wanted to provide. The minimum functionality we envisaged for our researchers included: Authentication/Authorization Services, Enhanced Content Models, Usage and access statistics, User configurable interfaces, Movement towards a pure Web based interface, Support for OAI sets, Integration with 3rd party modules such as federated search.

6.1.2 TRAJECTORY OF THE OPEN ACCESS INSTITUTIONAL REPOSITORY PROJECT

Janus University now had the funding for their OA IR Project. The Consortium web site states:

The [Consortium] project will identify and test software or solutions to support best practice institutional digital repositories comprising e-prints, electronic theses, e-research and electronic publishing.

And the Janus University IR Business Plan states that Janus University plans to create:

*... an institutional repository for [Janus University] research that will be a database that captures manages and makes discoverable **all types** of research publications and collections. The institutional repository for [Janus University] research will provide **consistency and stability** in the capture and description of research so that all [Janus University] research can be searched, discovered and accessed from one location – the [repository] website/repository. This will result in improving the **promotion and impact** of [Janus University] research {my emphasis} [Project Business Plan 2005-2006].*

However, the University Librarian has other ideas. While the repository message is clearly translated the OA message is mediated and amended. The University Librarian made an initial attempt to exert his influence by defining the role of the IR as providing a home for, and OA to, research not published in the “usual way”, such as working papers, technical reports, honours theses and so on – research outputs that were not generally published in journals or books.

Initially they did not seek the usual IR staples of pre- and post-prints of articles that would normally be published in the traditional sense through toll access journals and make them openly accessible.

[We] never went looking for preprints and post-prints of already published articles as a way to build the repository...if the published version wasn't freely available on the web, it was still accessible to our community, and if they had published it then it was more than likely in a journal which we took. So we took the line that why would we spend a lot of time and effort in a sense republishing things that have already been published [University Librarian]?

The University Librarian thus initially defined the initial role and purpose of the IR technology in the actor-network within his own vision of OA. He was happy to promote the OA vision when it did not disrupt the existing scholarly publishing system.

... there are all sorts of information, resources and assets tied up in universities that don't their way to commercial publication, will never find their way to commercial publication. But we have looked after them in their print versions, working papers, technical papers, so there is an immense amount of good useful stuff. And it seems to me that the stewardship we had applied to knowledge output that was in print that universities generated ... that we try and do it for digital outputs ... And I've always been a little bit worried that the preprints and post prints gets you into a republishing role. Managing the metadata about that is one thing but actually managing another digital version of something where the authoritative version is actually sitting inside a commercial journal is something that I still haven't come to terms with and I have not wanted to commit resources to [University Librarian 2006].

The implementation of the [unfinished] repository technology in the Consortium Library started in early 2005 with the aim of:

Understanding... the issues involved in developing institutional repositories, the cultural issues, the technical issues [rather than] filling the repository or get[ting] policies or so on hung from it [University Librarian].

Hence the Janus University IR would initially focus on research output largely outside “the scholarly publishing system”, material often referred to as “grey literature” (Halliday, 2001). Their objectives were to provide information management and stewardship for these outputs in an enduring way. This model reflected the pre-existing way in which the library had managed the university’s grey literature – cataloguing it and finding it a space on their shelves – now providing it with metadata, finding it space in their repository and making it more widely accessible to the world. Rather than an implementation the project was also seen as a research project, with the benefits of a research project being that you can change your mind having learned things as you go.

As the University Librarian was the mediator to Janus University on the topic of OA, his influence over his staff and the various committees on which he sat, meant that Janus University's IR project began with a specific and fairly narrow view of IR, that is that their IR would provide access to materials that would not necessarily find their way to commercial publication. This is a different view of OA to that proposed by most OA activists.

And I think that that is still an area of institution repositories where, I am one of these people, I have colleagues who disagree with me quite violently about this, but I still don't know that we have made the case [for OA] as persuasive as it needs to be. Others just think it is obvious that that's where libraries should go. I am still very open-minded about it. ... But I think, what I have detected here so far, I think is if you can guarantee stewardship, a way of looking after these things for the long term, I think that is very appealing to them. ... But I think my colleagues differ. Some are still very firmly in the OA camp. I haven't left it, I just don't think it's what drives institutional repositories and I think it's a very hard way to sell it within a university where publishing, particularly in a technical and professional university like [Janus University] where publishing in the best journal is what it's all about [University Librarian].

This view of the IR as being primarily for grey literature not only caused problems in the relations between the repository implementers and promoters and researchers, but also lead to the IR "resisting" post prints of published papers, by not having the fields to afford their "correct" deposit and access. A representation of the IR network mediating the University Librarian's particular view of OA is presented in Figure 6-3.

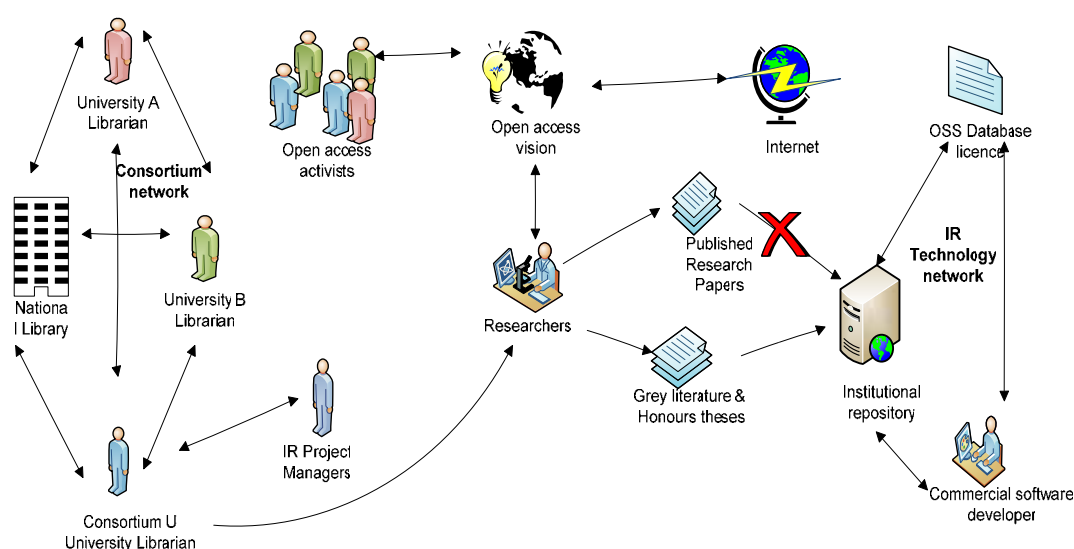


FIGURE 6-3: THE IR RESISTING PUBLISHED PAPERS

From the outset of the project the implementers believed in the importance of the technology. From the management point of view, it was envisaged that it would support a wide variety of data types, that it would be flexible and extensible. In addition they valued creating ease for the workflow from the user (researcher) end. In the words of the University Librarian:

If there are any barriers to contribution that are delivered by the technology then it's such a disincentive for people to contribute... so I think we have to get the technology as good as possible. And also if we put out something dodgy and rough as a production service, we're sunk.... [University Librarian].

In a way the project became focussed on the technology of the IR, although that was not the initial focus of the project. The University Librarian mentioned several times that he did not want to launch it until it was *shiny*:

So in a way it doesn't worry me that in the [IR] project we have spent so much time on technology. It became more of a software development project than I thought it would be. But if you can't get that bit of it right... it's not worth doing. So yep, it's been slower than I thought but I think it should be a better product for it [University Librarian].

Waiting for the technology to be *shiny* meant delays in the launch of the repository. One for the problems for the IR was that after each software upgrade a lot of work had to be done to move research output already in the IR to the new version. On the one hand the IR Project Managers wanted researchers to use, test and provide feedback on the software but on the other hand they didn't want too many people doing that, because it created a lot of work, not just in porting contents, but in porting any customisation across. This problem is scheduled to be fixed:

Because this is development software a lot of the customisation had to be redone from scratch whereas the latest version 3 it's, what they're saying is they've separated out a lot of the customisation so that when the versions change underneath the customisation will continue across which will be good [Project Manager 2].

A further mixed message arose. The Project sought researchers (see below Section 6.1.3) to test the system, but at the same time they did not want to launch it until it was *shiny* [University Librarian]. This created tensions for the Project Manager, who on the one hand was supposed to test the system and get feedback for improving it, but on the other hand could not announce it and could not create more work than was manageable. So on the one hand the IR was being promulgated, but on the other hand it could not progress too fast. When approached by an enthusiastic researcher offering to champion the project and wanting to start immediately, the Project Manager had to prevaricate, as illustrated in the vignette below:

Conversation: Project Manager and Professor of Information Systems

Professor, Information Systems:

It would be good to have champions. And even starting with experimenting with whatever you have now, irrespective of the fact that it is not perfect. And you may say well this is the functionality now, but the planned functionality is you will have this and this and this report, and this will be feasible let's say as of December. So it doesn't really need to be perfect and complete. And all research in information systems is telling us. Evolutionary approaches are much better than big bang approaches... So this might be an interesting thing we can collaborate on. Not only that we would like to play perhaps the role of the champion but also to perhaps assist you in the promotion and implementation of the idea. And once we well say adopt it here and people start putting their papers on, and we can even start something ... [Professor, Information Systems].

Project Manager 2

I don't want to open this can of worms and promise to deliver something promising that will fix it all, because I feel there is a big black box of unknowns...

This created problems, not just for researchers who had heard about OA and IR and wanted to use it NOW, but also for the library staff. Outreach Librarians who were, among their other duties, engaged to market the IR and find the content and offer IR services to researchers began to be queried about the IR by researchers who wished to use it for many OA purposes. However, with the IR launch continually delayed from its initial proposed launch in December 2006 for staffing, software and later copyright reasons, their job became a complex and difficult balancing act of promoting and answering questions about something that was not yet officially released for use.

As the technology was not developing at the speed expected, and the Library was seeking to launch the service in May 2007 a Business Analyst and an in-house repository Software Developer were appointed. This sped up the development of the technology considerably. The Business Analyst's meeting with researchers confirmed the wish of some researchers that the repository would afford the OA of their published work, where possible. The explication of this afforded the development of the repository in this direction. The Software developer, focussing directly on Janus University's requirements was able to fast track the software development which became *shiny*, or in other words, performed the tasks and presented the image required.

My perspective: JanusWorks

My development to *shiny* took longer than expected. I would have been willing to accept more research output, but my human colleagues thought I was a bit messy and difficult. However, there were many misunderstandings with the commercial software developers which meant that I was not ready to be launched at the intended time (Project Documents). This caused my human collaborators to postpone my official launch and to appoint my own personal software developer and business analyst. These guys really helped me by finding out what researchers wanted and then inscribing in me affordance for many of those things. My personal developer belongs to an e-list of lots of other Fedora/VITAL repository developers, and together they share information and work to keep us fit, and to keep improving our performance. Recently I have experienced difficulty with both my statistics and search functionality and these have been turned off (user experience). I hope to be able to turn them back on again soon, as my users miss these features.

But my usefulness seems to be growing. At the moment I hold 2,337 research outputs. At the end of December last year I only held 417. Of the items I look after, 1448 are theses. Students are required to place their theses in me, but researchers place their articles and conferences papers in me of their own free will. I guess those that do value their work being openly accessible to the world, and I work hard to assist them in achieving this goal.

Officially launched in December 2007 at the University's Academic Board, and with no other official launch other than the Outreach Librarians footwork, their job was difficult.

... the Outreach Librarians have come back, I had to give them a talk last week on what [IR] is and then I did a little presentation for them there's just dot points that, so that they're all got the basics. That it is a research project, that we do welcome it, that we contact me before you do anything because it is a research project and I don't really want people putting stuff in. And that if you put stuff in it will still be there? It just may not be using this software if we move the libraries not going to throw these things away. It's going to actually develop this into a production service this year but we're not quite ready so it's still a research project. There are a few key messages to get out apart from what a repository is. Yeah they wanted that immediately because they've been asked a lot of questions wherever they went [Project Manager 2 2007].

In addition, many of the Outreach Librarians were not themselves familiar with the concepts of OA and IR themselves, but were interested in responding to researcher queries. It was as if the Library and the Project manager were offering a program: "use our repository" and at the same time and anti-program "just not too much yet, it is not quite ready".

A further translation tension between program and an anti-program arose with the introduction of the Research Quality Framework (RQF), a Government initiated research evaluation exercise. Initially it was envisaged by Government and Universities that the IR initiatives could tie in with the reporting to the RQF. Thus the IR initially appeared to have an ally in the RQF, but as the proposed implementation of the RQF came closer it became clear that accessibility in the form of OA had taken a back seat to the pragmatics of managing a research evaluation exercise. On the 13th February 2007 at a colloquium entitled “The RQF Explained: Information Management and Repository Needs for the RQF” (<http://www.apsr.edu.au/rqf/colloquium.htm>) the Government Department announced that while it required that universities place their assessable research outputs in repositories, it would prescribe the submission of the published version of the paper, instead of the preprints and post-prints more likely to be available OA. Kingsley (2007) has termed this possible outcome the “OA mirage” of the RQF. This means that repositories will need to be configured to provide both open and closed access, which muddies the OA message for IR.

... so what is likely to happen is there is likely to be a separate instance of the repository for the RQF, because of the requirements of the RQF for only four outputs for each researcher and the formal published copy, so it will have to be a dark archive [Project Manager 2].

Despite the need for two repositories, an open repository as initially envisaged and a closed or “dark” repository for the RQF, many repository managers (including the project Manager at Janus University) saw the RQF as a positive because it would alert researchers to the concept of repositories and enable identification of potential output.

... our thinking at the moment is to create a separate [IR] just for that [RQF] because it's completely copyright controlled, we can't put it in the public one but where we can we are going to use this process to actually drag in either the pre or post print or the published copy if that's allowable into the open [IR] [Project Manager 2 2007].

Further, as the statement above indicates; the RQF did create an alignment of its own. It translated the repository implementation team into thinking about the repository in terms of pre- and post-prints of published works, in other words as a more traditional repository.

In summary, the actor network of this IR became increasingly complex as more actors became enrolled and relations between and among them increased. In terms of developing the IR to a state in which the University Librarian viewed it as acceptable to launch, the Business Analyst and Software Developer played important roles. Their relations with researchers, each other, and the technology afforded the IR to “work” for published papers as well as for grey literature. Their role in this was supported and itself afforded by the RQF proposed by the

Government Department. However, the Government Department and the RQF related to the IR network as both program and anti-program, by encouraging the involvement of IRs yet requiring the “official published version” of the papers to be evaluated. These are not generally permitted by publisher policies to be placed in OA IR, so a separate *dark* IR was created for these. Development of this dark archive subsumed much of the implementation teams’ energies during this period. The actors and their relations at this point are illustrated below in Figure 6-4.

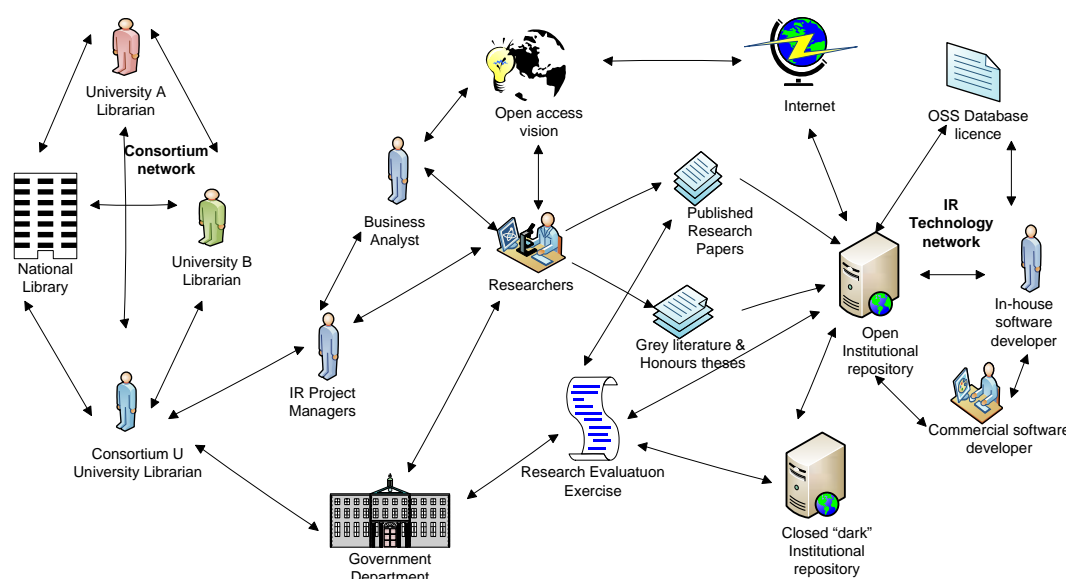


FIGURE 6-4: THE IR NETWORK GROWS

However, an election on Saturday November 24, 2007 saw the Australian Federal Government change leadership from a Liberal/National Coalition to a Labor majority. The current state of research assessment in Australia is that on the 24th December 2007 the new Labor Government cancelled the RQF, and on the 28th February 2008 proposed its replacement; Excellence in Research Australia (ERA). The change of government also saw the demise of the government department discussed until this point and its reassembly as two new government departments, one of which will oversee research and one education. Thus, the ERA is to be developed by the Australian Research Council (ARC) in conjunction with the new Department of Innovation, Industry, Science and Research (DIISR). It is proposed that the ERA will assess research using a combination of metrics and expert review conducted by Committees of experienced, internationally-recognised experts. It is uncertain what if any role repositories will play in the ERA.

6.1.3 ENROLLING RESEARCHERS

The translation of researchers to IR and OA did not occur in an orderly way. It did not move from problematisation through intersement, enrolment and mobilisation. It happened in a much more messy way with translation and anti-translation, programs and anti-programs operating at the same time. It was fragmented. Researchers report a multiplicity of perspectives, intentions and actions regarding OA and the IR. To better understand those perspectives in the next section we examine some of those programs and anti-programs which act to shifting alliances for and against the IR and OA.

Early in the project researchers from different disciplinary backgrounds were recruited to run trials providing material in electronic OA versions to contribute to building and testing the IR. Initially in 2005 Project Manager One scoured Janus University web sites and personal contacts for researchers willing to trial the system. In consideration of the University Librarian's approach, many of those initially contacted were in Schools which had "grey literature"; working papers, technical papers, honours theses and so on, so they were mainly in engineering, applied sciences, and economics. Initially those academics that were approached to trial the repository were interested in this approach. Researchers interviewed in engineering and earth sciences, have potential readers outside of academia; engineers, and scientists in industry, consultants, government. One academic, manager of a research laboratory which produces a well-known series of technical and research reports, often on well funded grants or for paying clients, which have a much broader, indeed international applicability, supported this view. Not interested in rewriting these reports for journal papers, he was none-the-less interested in getting publicity for them via the web, and perhaps generating download statistics and citations to bolster the laboratory's reputation. For him, putting the items in the repository rather than just on the Laboratory's web pages made sense as it provided a framework for deposit, metadata, and would link with web services and search engines such as Google and Google Scholar:

I don't care about the publication stuff [writing up articles from technical reports] because the impact from the dollars coming in is already enough...but one of the things I wanted in return for putting our reports in the [IR] was lists of everyone downloading, or at least numbers of downloads, ... I actually felt that by taking the technical report series and making it available so that people could download it and use it and reference it would substantially increase our number of citations and therefore our impact.... But there's no point in just putting them up there. You've actually got to get the key words and stuff correct so that people can actually find them [Research Laboratory Manager 2006].

Another researcher from a different disciplinary background however expressed much stronger support of the OA vision. All publicly funded work should be publicly available. Her work, in a public policy health field, would have a broad readership in health services, policy and government, as well as patients and patient support groups.

...in publicly funded research areas there is a requirement that publicly funded research is *publicly accessible* ...that's of course a very important issue for us
[Researcher – Social Science of Medicine]

Programs to engage researchers into the trial of the IR (Figure 6-5), and beyond into continued use of the IR were as follows. At the top of the list was the find-ability and accessibility of their work in Google, Google Scholar and other search engines and the potential this created for enhanced readership and potentially enhanced citations. For others the ideal of OA as a public good appealed. Still others thought it would be good for the university's image:

It'd add prestige to the university. I don't care about me. I think it would add prestige to the university if people from outside the university could see the achievements of the people within the university. I think that's absolutely madness that they make that so difficult... [Researcher, Science].

And good to have the research record of the institution accessible and available in one place

I think one place, group of people, not individuals necessarily but a, how shall I say it, a department or a unit be responsible for it, provide documentation so that continuity when people leave, there's a continuity there and it can continue within the institution [Professor, Information Science].

So in 2005 and 2006 a small number of researchers were enrolled to test the system and provide feedback as expressed in Figure 6-5.

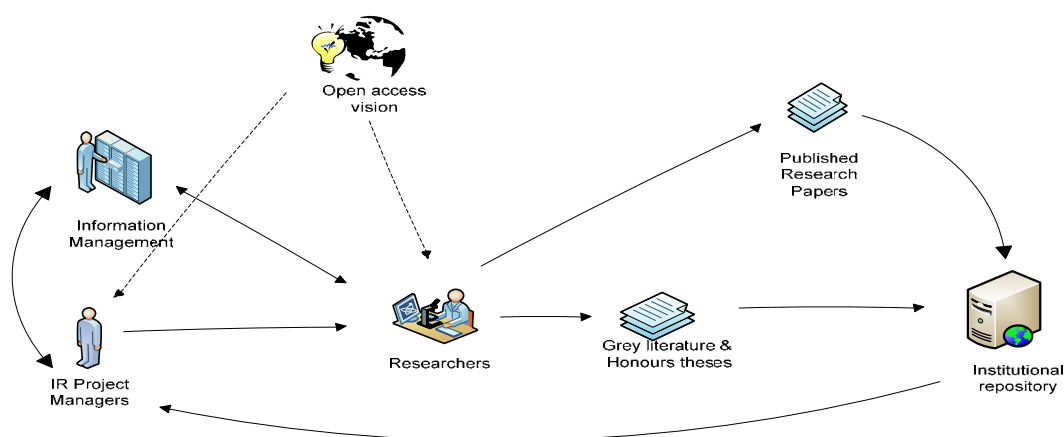


FIGURE 6-5: ENROLLING RESEARCHERS 2005-2006

However, the feedback was only one way. Intent on the project and with:

- A high incidence of staff turnover,
- Slow testing and upgrading by the software vendors
- New requirements and expectations revealed through interrogation of records in the repository, on-going discussions and trials with researchers.
- The University Librarian not wanting to officially launch the repository until it was *shiny* lead including not opening the IR to Google and Google Scholar until late in 2007.

The project forgot to provide feedback to participating researchers. The vignette below provides an example of what can happen when this is the case. Other early participants reported similar stories.

Enrolling actors in an open project requires ongoing work:

Mining Engineering goes it alone

A researcher in Mining Engineering was keen to participate in the trial. His School participated by putting honours and masters theses in the IR in 2005.

Well, I'm not too sure, because we didn't get the feedback. It was basically a one-way process in terms of putting information into the database. It's basically been – is it two or three years – two or three rounds of honours theses were the main forms of information that went into [the IR]. ...Yes, we'd heard there's going to be a trial to work it out, with the intention of becoming main stream. Well, a few years later we hadn't heard what the outcome for the trials and whether the decision had been made to go mainstream, so we assume, as you say, it's dead in the water.....

These delays acted as an anti-program for this researcher and for his School, and for the IR, however, not for the OA vision. Not having received any feedback and assuming the project was “dead in the water” the researcher instead began to place work on his own School's web pages in 2007 where Google shortly found it, and his own OA vision was achieved. His School is getting requests “for further information from around the world”. They view “communication with the external environment” as so important that they have put up their thesis work, conference papers, technical papers and reports on their web pages despite knowing that the work in doing this may become redundant if the IR becomes fully implemented and they chose to migrate it there. Their interests are already strongly aligned with the IR project but their needs were immediate, they did not want to wait until the system was shiny, they wanted it now, and would have been happy with promises of incremental upgrades and advances.

In 2007 other institutions joined the consortium and an electronic discussion was developed for Repository Managers and Developers to share their problems and solutions. By 2007, many Researchers had read about OA in the course of their professional reading, or had been experimenting with Google Scholar and wanted to know how to “get there” and how to make their work more accessible on the web. In addition, I provided feedback to the implementation team about the concerns researchers had about the lack of feedback. Feedback was apparently planned. The appointment of the Business Analyst and the repository Software Developer occurred in May 2007. Feedback to participants was formalised. Further the Business Analyst consulted with researchers about what they would actually find useful in an IR, and worked with the Software Developer and the Project Manager to provide as much as possible of the usability required by researchers’ in line with the funding requirements. If we look at a visual representation in Figure 6-6 of the IR project in 2007 we see more actors enrolled and more connections between actors, particularly researchers. Further, we see no blockages between pre-and post- prints of published papers being added to the IR, and the repository is free to provide feedback to both researchers and the implementation team.

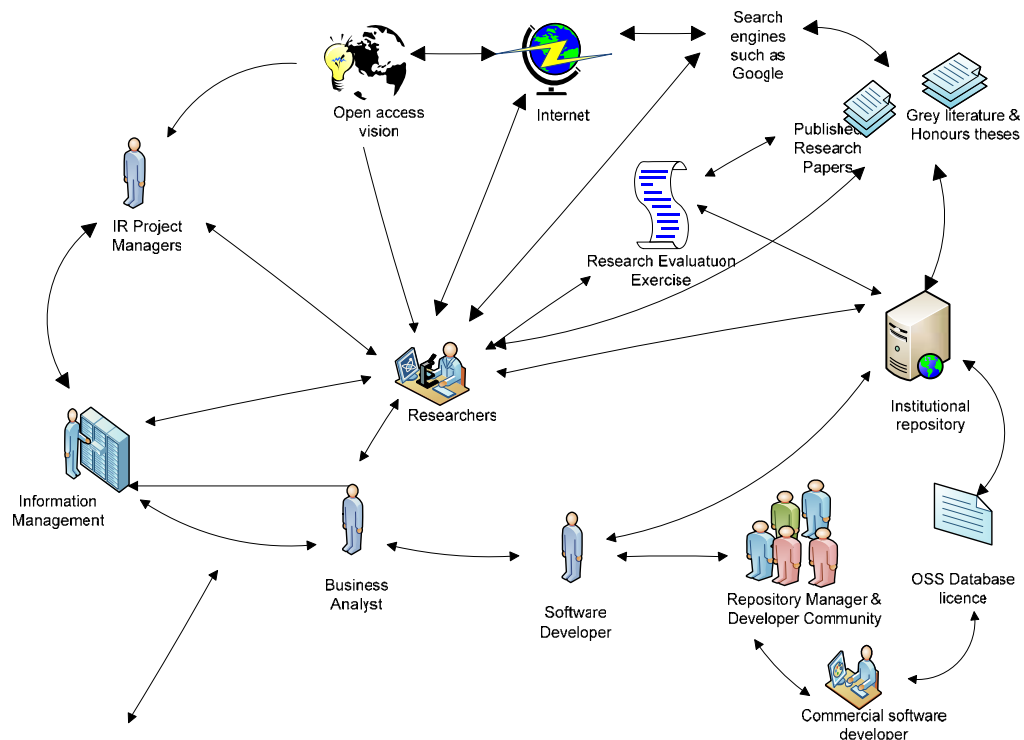


FIGURE 6-6: ENROLLING RESEARCHERS 2007

More actors and more connections lead to more activity and more development of the IR and its network. However, it also leads to more complexity. As the repository developed, more

actors began to play a role, some of which work to make the IR network more durable, and some which work against it. Sometimes actors' actions can strengthen the network and make it more durable and other times the actions of the same actor can serve to weaken the network. Examples below introduce new actors and the relations they have in the IR network.

6.1.3.1 COPYRIGHT, LICENCING AND JOURNAL POLICIES

Many researchers believed that their copyright and licensing agreements with publishers prevented them from placing post-prints or author copies of refereed works in the repository. Even the Research Laboratory Manager happily placing the Lab's grey material in the repository would also have liked to put pre- or post-prints of journal articles or conference papers prepared by the laboratory into the IR. However, he believed that the copyright licensing for the journals and conferences in which they published would prevent that. The OA vision in this case was not powerful enough to overcome the perceived agency of copyright:

We would like to use the [IR] for those, but the problem being many ... refereed conference papers and the journal papers... have copyright on them and you shouldn't really be putting them up [Research Laboratory Manager].

We've lost our copyright. When we put in the journal, we signed over the copyright, there's nothing we can do about it. So there's that perception whether it is or not about being able to upload it to another repository where it's allowable or whatever, it's put in the too-hard basket [Associate Professor, Mining Engineering].

In many cases self archiving of pre and post prints is permitted, but in order to understand whether or not a particular journal or conference allows it, authors need to read and understand often complex and lengthy copyright and licensing agreement, which may be different for every paper they submit.

Excerpts from publisher copyright statements

Many publisher copyright statements are complex and confusing. Authors are usually asked to sign them as a pre-condition for publication. Many authors report they are so happy to get a paper accepted and anxious to move on to the next task at hand, so they sign them without deep thought about either the implications or that they may request an addendum seeking permission to self-archive. The excerpts below are, first from a publisher which permits self-archiving, and second, from a publisher that forbids it.

Green (Permits self-archiving)

- ... As a journal author, you retain rights for large number of author uses, including use by your employing institute or company. These rights are retained and permitted without the need to obtain specific permission from [Publisher]. These include:

- *the right to make copies (print or electric) of the journal article for their own personal use, including for their own classroom teaching use;*
- *the right to make copies and distribute copies (including via e-mail) of the journal article to research colleagues, for personal use by such colleagues (but not for Commercial Purposes**, as listed below);*
- *the right to post a pre-print version of the journal article on Internet web sites including electronic pre-print servers, and to retain indefinitely such version on such servers or sites (see also our information on electronic preprints for a more detailed discussion on these points);*
- *the right to post a revised personal version of the text of the final journal article (to reflect changes made in the peer review process) on the author's personal or institutional web site or server, incorporating the complete citation and with a link to the Digital Object Identifier (DOI) of the article; ...*

White (forbids self archiving in IR for 24 months after publication)

By signing this form you certify that:

... your Contribution is your original work, has not been published before, and is not being considered for publication elsewhere, and that no version of the Contribution in the same or a similar form has been published in electronic form on any website or in any digital repository whether personal or institutional. If the Contribution is accepted for publication you may re-publish it on your personal website or in your academic institution's digital repository without seeking further permission from the Association, but no earlier than 24 months after publication by the [] and only if a full bibliographical reference to the original source is included: see 3 above. (The Association will provide a PDF version of the final typeset file upon request for this purpose.)

In some senses the interviews for this research interfered with the trajectory of the repository implementation. At the end of each interview I often asked interviewees if they had anything to add, or if they had any questions. Often they did have questions about OA during which the issue of copyright was inevitably raised and discussed. I explained that many publishers allow author copies to be deposited and in my thank you email to participants when requested sent the link to the SHERPA RoMEO website, a service which explains publisher copyright policies and which publishers and journals allow self archiving and which do not. However, the number of researchers interviewed is an extremely small proportion of the number of researchers in the institution. So while many authors perceive that copyright and licensing agreements

prevent them from submitting their pre and post-prints to the IR, in fact if they checked their publisher agreements, and/or the SHERP-RoMEO database, they will find that this is not always the case.

A counter anti program was developed by the repository staff in a statement on the repository "Policy and Guidelines" web page indicating that library staff will assist with the checking of copyright. This indicates a program to help researchers through the anti-program of copyright and licensing. However an anti-counter-anti program exists as on the deposit form researchers are required to tick 10 boxes of complex legal copyright statements. The launch which was re-scheduled from the end of 2006 for the end of September 2007 was further delayed when the university legal office, as a new actor, became involved and required some new copyright scripts to cover the university's perceived liability to be added to the online deposit form for the repository prior to launch. As a result of the intervention of the Legal office, after filling out the form with information about the research output researchers are required to affirm up to ten copyright and licensing statements, depending on the type of work being submitted. In the words of Project Manager Three, researchers find this "tiresome and tedious". Despite offering the program of *"[IR] staff will check that the publisher allows author self-archiving before uploading deposited material to the web"*, these statements copyright requiring up to ten items of agreement on the deposit form (or on a follow up email if someone else does the deposit for researchers) acts as a disincentive for researchers.

Items for agreement on the IR submission form for authors

(Each paragraph accompanied by a check box)

LICENCING INFORMATION

Your research output which is "Title of work".

When submitting a Work, you, agree as follows:

You grant to [Janus University] (acting through IR) permission to reproduce, publish and electronically communicate the Work under the terms of the Creative Commons Attribution-Non-Commercial-Noderivs 2.5 Licence. You can obtain information about this licence from the [IR] Procedure and further information and the full licence on the website <http://CreativeCommons.org/licenses/by-NC-ND/2.5/au/>

You agree that [Janus University] may electronically store, copy or translate the Work in any medium or format for purpose of future preservation and accessibility.

By agreeing to this licence you are not transferring the copyright in the Work to [Janus University] or the end-users. You therefore retain the right to use and publish current and future versions of the Work in other places.

You warrant that the Work you are submitting to [IR] is original and is not copied from another author; and that the material does not infringe upon someone else's copyright. Where the Work

contains material of which you are not the copyright holder and where that material is more than an incidental reference, you warrant that:

- you have obtained the permission of the copyright owner to grant [IR] the rights referred to under this licence; and

- that third party material has been clearly identified and acknowledged within the Work.

The co-authors of the Work are:

You warrant that all co-authors of the Work are listed here and that you have authority from each of them to give [Janus University] the rights under this licence in relation to the Work.

[Janus University is not under any obligation to take legal action on behalf of you or any other person who has rights in the Work, in the event of a breach of your/another person's intellectual property rights or any other right in the Work.

You warrant that, so far as you are aware, the Work does not contain offensive, defamatory or unlawful material. Should any part of the Work be found to contain such material, UNSW may remove the Work from [IR].

You agree not to deal with the Work in a manner which is inconsistent with this licence that you have given to [Janus University] (for example, you will not grant an exclusive licence to reproduce your Work to another person).

[JanusWorks] will determine collection and retention policies and decide whether or not a work is accepted to be included in [JanusWorks] and a time at which (if at all) a work is taken out of [JanusWorks] and therefore is no longer accessible through this repository.

Thus even the researcher who is translated by the OA vision and voluntarily wishes to self-archive pre- or post-prints of articles published in a traditional journal can be thwarted.

6.1.3.2 TECHNOLOGY

I spoke before about how the IR technology was initially based on an open source database and a commercially developed user interface for deposit and searching. The latter developed slowly as it was constrained by delays from the software developers and in providing feedback to implementers and developers. Now we turn to look at how the researchers, the intended users of the IR view its technology. Their relations with the technology ties in with what they want to do, and whether the technology will afford this.

Researchers mentioned that the IR technology must be easy to use and provide useful functionality to be attractive for them. Many mentioned that they have to do so much reporting about their research, that only having to upload a paper's details once would be an incentive. Could the technology designed for one purpose be redesigned for many purposes? For example, could the repository also perform their research reporting, provide links to their

school web pages to automatically update their publications links, automatically upload information about their publications to any university system requiring this information?

Depositing

When I deposited material into the repository myself, I had to fill in an online form and upload a pdf of the full text. Some questions require me to do a little research. What is an ASRC RFCD code? Cutting and pasting my abstract and citations made a mess of the formatting. I had to be persistent and diligent to work it out. I had to care enough to spend the time. But it was not difficult, just time consuming the first time. However, once my work was in there, it was not findable. Until very late in the project the repository was not opened to Google or Google Scholar, so I felt my work was unrewarded. As the repository developed features, I found these to be useful. I confess I checked my download statistics. Were people reading what I wrote?

Several interviewees suggested that additional functionality of the IR technology would be required for them to use it. For example some reports and publications are ready for immediate release. Sometimes consultancy or copyright contracts require confidentiality for a period followed by delayed release. A timed release of publications would be useful. One interviewee believed that repository software could provide researchers with links to their *oeuvre*. He had read that repository software could assist in managing that. He had been translated by the OA vision in his professional reading and wanted his own university IR to perform these tasks for him.

I want to be able to have from our web pages a series of short cuts into the [IR] so that ...I don't have to keep an up-to-date list of what we have done. All we should have to do when we have finished something is put it on the [IR] and then in turn it is uploaded to our web pages too ...Well, just print me the [government department reporting requirement] reports. If it can be done through the IR system that makes a lot more sense...We're trying to present the University doing all these things...[Research Laboratory Manager]

To examine in more detail the role of the technology observations were conducted of interactions between the business analyst and researchers. The Business Analyst went through a new and improved version of the software with researchers, who then uploaded a recent paper. Interestingly, some were not familiar with the phrase “OA” but were very keen on the idea of making their research “freely available to the public”. Until these meetings some had not been exposed to the OA vision. Others thought that because they could freely access papers, OA was already achieved, as they did not understand their “seamless” access on campus was available because of library subscriptions. In the course of the conversation OA was explained and most researchers readily adopted and used the term “OA”, indicating the vision was enrolling them. Many expressed the importance of the repository data being

exposed to search engines, in particular Google and Google Scholar. For them this was a key expression of congruence with the OA vision, and they could not understand why it was not yet enabled and had not been enabled for the length of the trial. Most were careful, reading screens and taking care in the correct entry of data about their papers.

Several expressed dissatisfaction at the detail which the repository wished them to upload, for example they felt details such as Research Fields and Courses and Disciplines (RFCD) codes, produced by the Australian Bureau of Statistics were more for the benefit of the analysers of research or for use in maintaining the agency of the reward system than for OA or the researchers themselves and their potential readers. Further the complexity of the upload screens and the complexity of the statements to protect the university regarding copyright were regarded as intrusive and a disincentive. They perceived these issues to be tied in with benefit to the university, rather than benefit to them or the OA vision.

Many expressed frustration with the software. To them it appeared as if they submitted articles which disappeared into a “black hole”. The works did not appear in the repository for some time and they received no feedback from implementers. This occurred during the period 2005 and in 2006 when the initial interviews were being undertaken. As the position of Project Manager stabilized and with the appointment of the Business Analyst this problem resolved. But it was an issue when the interviews were being undertaken. The reliance, at least of early iterations of the software, on humans to check submissions for accuracy and copyright compliance, and therefore the creation of back logs and perceptions of lack of response was a cause for concern. Suggestions were made to improve the technology, for example by:

- Programming it to “remember” individuals and thus cut down on the amount of keyboarding;
- Reducing complexity of input screens and output views;
- Making the advanced search facility work or removing it from the options available
- Creating input and output functionality with EndNote and/or allowing batch uploads from Excel or Access;
- Making the text on the screen more informative by using plain English rather than programmer and librarian jargon;
- Linking it with all other research reporting in the university, so research only needed to be reported once;
- Providing dynamic links to outputs that a researcher could place on their own web page, providing automatic updating of publications lists.

However, I observed that the act of being shown the technology and the communication with the Business Analyst in fact enrolled researchers as allies for the OA vision and in some cases for the IR. If we search the IR even now we find that many of these consulted researchers continue to be users of the IR even though the technology has not yet been transformed to take up all of their suggestions nor officially launched.

6.1.3.3 ACADEMIC REWARD SYSTEM

Further fragmentation of the OA vision and the IR implementation occurs as the government department and the university which are funding, building and promoting the OA IR, yet are at the same time promulgating the traditional researchers reward system from the traditional scholarly publishing network. The reward system is a key actor in academic life, rewarding researchers for publishing in highly ranked traditional journals with further work, promotion, funding for future work and in effect punishing those who do not accept its agency with less work and funding and no promotions. The reward system encourages researchers to publish in peer reviewed, high impact journals, but does not reward them for then placing pre- or post-prints of the papers in the IR.

We can see here the 'program' by funding agencies to make all publicly funded research publicly accessible and the 'anti-program' by these actors themselves, which reward universities for research outputs published in journals, reinforced by journals and conference publishers to prevent it, each impacting on the IR actor-network emergence. The actors are currently exerting inconsistent, even contradictory influence on researchers and the technology thus fragmenting and weakening the IR actor-network. The researchers interviewed are aware of the contradictory nature of the university and government department policies regarding reward systems and the IR implementation and see the process as a game.

We can see here the program by the University and the Government Department to make all publicly funded research publicly accessible and the anti-program by journal and conference publishers to prevent it. The anti-program is complex with the actors implementing the IR themselves, such as the University through its reward systems, and the Government Department through its research funding policies exerting contradictory influences on researchers thus fragmenting and weakening the OA and IR actor-networks.

A further example of program and anti-program of the OA IR vision and implementation is that the very bodies which are implementing IR, the Government Department and the University

Administration, have a policy requiring access to the “official” publisher copy for evaluation. These “official” publisher copies are generally not permitted by journal policies to be openly accessible, implicitly discouraging OA.

6.1.3.4 DISCIPLINARY NETWORKS

We know that different disciplines and even sub-disciplines have their own practices regarding publication.

... here in our faculty it's a very varied environment. You know if you talk to people in media, film and theatre you know they all have different kinds of publishing standards or norms from literature, social science and historians. I think historians would be good to interview because they've got a much more traditional way ... it's almost like a normal science in itself you know [Professor Social Science].

A further anti-program for the IR, but not for OA is the practice within some disciplines to publish working papers and to deposit them and copies of more traditionally published works in disciplinary repositories and scholarly disciplinary networks. Some researchers are tied in through their disciplinary communities to OA disciplinary repositories (DR) and the value their disciplinary community places on the OA vision for the community. When speaking of SSRN one researcher said

Well, I think ... if you're not there, you're dead. You're not playing the game. So you're not there for two reasons: either you're not playing the game or you have certain, like a power, to do it otherwise [Professor, Finance].

Researchers such as this one can not imagine the use to them of placing a paper in an IR when it was already in an OA DR. The DR targets their specific community of readers and also provides access to the wider world. Apart from additional work in uploading to two repositories, having papers in two places dilutes their download statistics, making them more difficult to follow.

... As I said, the smart way to do it is to – in my discipline, meaning in finance and economics, to have the SSRN ... as the very, very top schools did. Harvard, Yale, et cetera, et cetera, et cetera. So there's no question about it. I can't think, why would one want to do it in a university, in my discipline, I am not sensitive to the criteria in others. But in my discipline, I don't think – I can't think of a reason why one wants to do it here and not there [Professor, Finance].

Similarly a physicist would always deposit in the DR arXiv. DR's offer extra functionality such as alerts to disciplinary and sub-field colleagues. Sometimes journals have relationships with particular repositories which enable a relationship between the OA vision and the traditional scholarly publishing network. Researchers question the need for more than one place to

deposit or search and believe it should be technically possible to achieve integration or at least communication between repositories. As one physicist said

Some journals will automatically pickup submissions from the arXiv, if there is a link available. I wouldn't mind if the institution mandated reporting and deposit in an IR, but would prefer that the software would allow links with disciplinary archives such as arXiv to eliminate duplicating deposit. I would like all publication reporting to be centralized [Professor, Physics].

There is an interesting sub-message here is that he is not going to voluntarily deposit in the IR, however, should the institution mandate it, he will comply.

In addition to the informal programs of disciplinary affiliations, formal programs from certain faculties seek to enrol researchers in DR as opposed to IR networks. This applies to grey literature such as working papers, and well as to post prints of published works. An example from a faculty email follows:

The [Faculty] has recently established a formal working paper series through SSRN. We have an opportunity to set up individual 'topics' under the [Faculty] banner to represent individual disciplinary schools and research centres. This presents an excellent means of gaining greater exposure for our research and will allow schools and research centres to maintain a working paper series on SSRN as part of the [Faculty] subscription which could then be linked to individual School/Research Centre web sites [Associate Dean Research].

6.1.3.5 OVERLOAD, NOT MY JOB, NOT MY CONCERN

Currently researchers at Janus University may have to report their research four times in four different ways: To the annual university research data collection, their own School databases, their personal CVs or webpage's, and now to the IR. If they belong to a disciplinary community that supports a repository they can be reporting everything and filling in forms five times. Given the time pressures on researchers some indicated there would need to be a "carrot" to encourage them or some of their colleagues to use a repository:

At the moment there's no reward for it. There are rewards for the documentation system at the moment, but there isn't for this, so because there's no reward, it's not valued; if it's not valued, then why do it? I think that's the perception [Senior Lecturer, Engineering].

Researchers such as these are not translated by the OA vision alone, even those informed about potential reader access and citation advantages.

Other researchers were clearly enrolled by the OA vision, but viewed putting papers into the repository as work that should be performed by administrative staff or "trained information managers", paid for by the university out of, for example, the administration funds it extracts

from research grants⁴⁷. Not only are they short of time and energy to perform deposit, it is important to them that “correct” details about their papers were presented to the world, and information managers would be better at making this happen.

6.1.4 JANUS UNIVERSITY SUMMARY

A complex array of programs and anti-programs exist which work to enrol or prevent enrolment in the OA IR project. Some of them are presented here. Visually we might represent some of the programs and anti-programs as in Figure 6-8. Often the actors working to prevent enrolment are actors from other competing networks, such as the traditional scholarly publishing networks. However, often, and confusingly, the actors working to constrain the IR network are sometimes those working to make it durable.

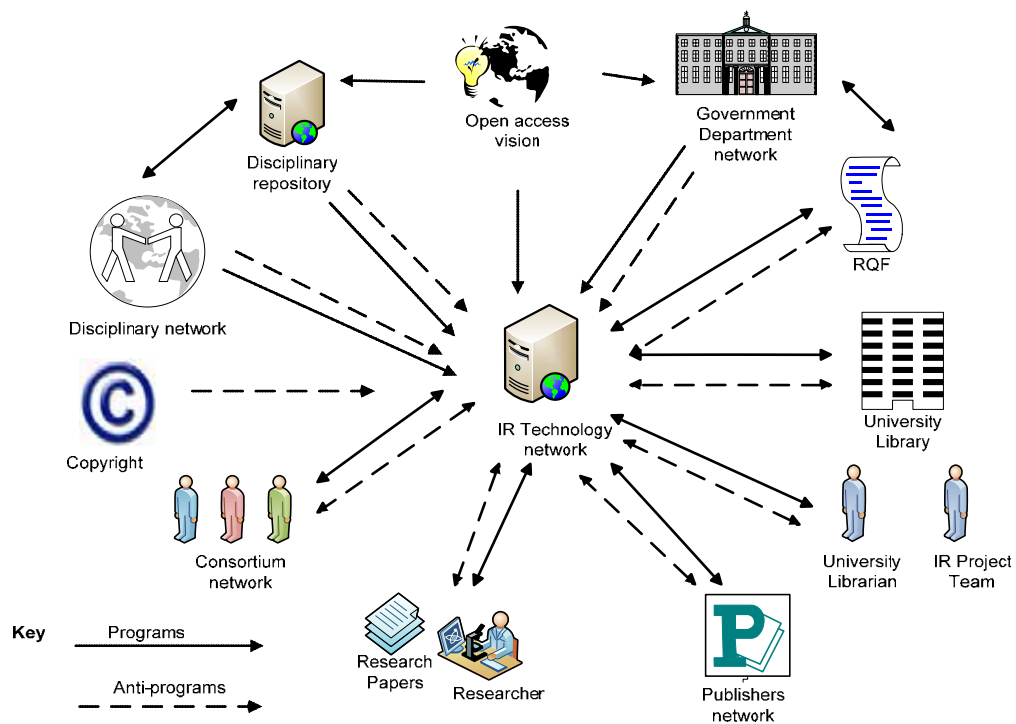


FIGURE 6-7: PROGRAMS AND ANTI PROGRAMS FOR IR AT JANUS UNIVERSITY

Researchers inhabit more than one network. They act within their university network, the traditional scholarly publishing network, their disciplinary network, and so on. In addition to

⁴⁷ Interestingly, at the time of writing up this thesis (July 2008) Outreach Librarians were writing to researchers offering to batch uploads of their work to the IR. However, this was not a consideration at the time the field work was being undertaken in 2006 and 2007.

the requirements of the disciplinary networks other examples of this multiplicity emerged in the interviews. Several researchers, while supporting the OA vision, were concerned that the enactment of OA through IR or even DR may disrupt and disadvantage learned societies and associations of which they are members. Examples cited were where access to papers was an incentive to membership or where the society made a profit from journals which were then used to subsidise other society activities. It was felt that widespread adoption of self-archiving may lead to the demise of journals. Researcher's membership of the networks of these societies, of the traditional publishing network, and potentially of the OA network created conflicts they found difficult to resolve.

The IR actor-network has been emerging through the translation "moments" with enrolment and anti-enrolment activities overlapping and happening in parallel. Some actors such as researchers with clearly aligned interests are enrolled and have taken steps to mobilise other actors to utilise the proposed IR. On the other hand others see their potential interests as still influenced by anti-programs and cannot clearly see how their opposing interests can be reconciled and alignment negotiated. Most researchers interviewed were and are interested in areas beyond the University library's proposed IR solution and wish to put versions of their published papers into the OA repository but see the copyright restrictions of publishers and conference organisers, and the policies of the government department and the very University providing the repository, as barriers.

Initially The University Librarian envisaged the IR as a tool that Janus University community members might use, to store and disseminate their "grey" literature, rather than as a tool to further disseminate the university's published research to other researchers and potential readers who may not have access to the commercially published literature. This meant that initially the OA vision at Janus University was enacted differently to the OA vision enacted elsewhere, most notably the OA vision promulgated by OA activists. It also meant that the IR implementation was confused in the messages it took to committees and researchers. The message conveyed by the university librarian was different to that conveyed by the Consortium Web site and the Janus University IR Business Plan the IR web page and other communications.

The capability of actors such as the OA vision and the IR to become a durable depends on their ability to translate other actors. Their trajectory towards durability involves convincing other actors to adopt its program of action. They enrol and mobilise allies such as the Government Department distributing development funds for IR, the consortium and the University Librarian

of Janus University to reinforce their work and counter the anti-programs. At the outset, the IR at Janus University had a different trajectory to the broader OA vision. The IR was to focus internally on university information management, dissemination and storage of grey literature. However, demonstration of the IR to researchers and the increased visibility of work by OA Activists and other researchers, saw its trajectory become increasingly aligned with the OA vision as researchers connected their reading in their disciplinary literature on OA with the IR, as the RQF opened implementers minds to including material published in other ways, or who simply saw the ability of the IR to perform OA. Thus the IR resists the University Librarians initial vision for it and became increasingly aligned with the OA vision.

But it is a continuing story rather than a stabilised trajectory. Durability is by no means assured or predictable. We see that the different actors we have encountered so far have different perspectives, different concerns, different programs and anti-programs. If we compare those versions Latour suggests that the “degree of alignment or dispersion will be enough to evaluate the reality of a claim” (p.127). The durability of the position of OA and the IR lies in the convergence between what OA, the IR, its implementers and its users expect it to do. But the IR is not yet far enough through its trajectory for us to predict its durability or demise.

In many ways the University Librarian identified the problem in our initial interview when he indicated that the project was a research project rather than an implementation. There was not at the beginning a commitment to a production service. Therefore initial introductions of OA and the IR to researchers were tentative and targeted a small group with a sub-set (grey literature) of research outputs for testing. In many ways this approach held back the IR and certainly the OA vision. In the words of the University Librarian himself:

One of the problems in marketing something like [the IR] is being absolutely clear to people about what you are selling them. And I still don't think we have got that story straight [University Librarian].

For researchers the emerging University IR actor-network is partially overlapping and colliding with traditional publishing actor-networks and disciplinary OA publishing networks, through influences, relationships, and negotiations among various actors. We can diagrammatically represent some of these networks. The Literature Review reveals that scholarly publishing and OA could be seen as describing separate heterogeneous actor-networks, comprising of an entwinement of social, material and technological actors who work together to produce the whole – the scholarly publishing and OA networks. Similarly the IR implementation and the disciplinary community could be seen as an emerging actor networks. The descriptions and

diagrams illustrate complexity of the networks involved. Actors belong to multiple networks and this multiple membership accounts for some of the translation and anti-translation programs we have encountered as actors struggle to reconcile their different identities in multiple networks.

We find that OA and IR are not in the minds of researchers or implementers synonymous. Further, the University Librarian as a representative of the implementers is ambiguous about OA.

While researchers are translated by the vision of OA, they are not all translated by the IR into seeing it as the best way to achieve OA. Researchers are willing to be translated by the OA vision, but other actors, for example journal policies, the academic reward system, and copyright, are conducting anti-OA programs, attempting preserve the strength of the existing actor-network. We see how the technology itself hinders translation by being difficult and non-responsive to researchers needs.

We see how the OA vision itself works with intersecting but possibly separate actor-networks (e.g. disciplinary communities and institutional communities) which confuse and conflate the IR message (Hanseth et al., 2006; Heeks & Stanforth, 2007). As one of the implementers put it:

Repositories are a solution in search of a question. The technology is there, but the policies aren't there to support them... [Consortium Communications Manager]

This analysis shows that the emergence of this IR actor-network is ambivalent, subjected to programs and anti-programs, and that enrolment of implementers and researchers is not a natural and straightforward process. The IR actor-network is still clearly a fragmented and continually shifting alliance, far from becoming an entity convertible into an immutable mobile or a black box. There is still occurring the entry of new actors and changes in alliances as researchers experiment with alternatives in their relations with scholarly publishing.

6.1.5 JANUS UNIVERSITY POSTSCRIPT

At the time of writing up (16 October 2008) I thought I would check in with JanusWorks. I found he had a healthy 2,425 deposits. However, on checking those deposits I found that 241 were Research Masters Theses and 1,257 were PhD theses, which left 927 deposits of eprints of conference papers, articles and other works. I am able to browse by date and find that 448 deposits are for 2007 publications and 245 deposits for 2008 publications. As these deposits also include the theses, it is clear that publications in JanusWorks publications are only a small proportion of Janus University's HERDC reportable items (more than 4,500 p.a.), and must be

an even smaller proportion of their complete research output. I wonder why. I contact four of my previous interviewees. Two do not respond. One, a Professor in the Social Sciences who was enthusiastic about the idea of OA in our first interview has deposited only one paper and responds simply “My experience with JanusWorks has not been as good as expected”. Follow up indicates that it is a matter of complexity and time. While in favour of OA (she wanted to place her work in the repository “to make my work more accessible, searchable, and available to a wider audience”) the work associated with finding her author’s final copy of works, so as to be able to sign the licence and then “finding out exactly what the conditions are about depositing pre-prints, looking for the final version of the paper [were too time consuming] ... So nothing happened after that first step”.

A fourth (Lecturer in Business Law) has deposited three papers. She finds JanusWorks:

Quite easy to use but not really clear about what I can put up on it and what I can't. ... I would find it very helpful if there was a person (not an email address or a help line but an actual designated person) who could run me through it once and then who I could phone if I had queries.

Further she finds JanusWorks a useful tool for making her work openly accessible because:

... the audience for my research includes practitioners and policy makers who do not necessarily have access to SSRN. I expect there is more chance of my research reaching a wider audience at an earlier stage than if I relied solely on SSRN.

This researcher is likely to continue to use JanusWorks for the following reasons:

One, to support my employer; Two, I believe OA to research is a better use of global resources than people reinventing wheels because they can not find out what has already been done. And three, If we all put all out research on JanusWorks then it would be a lot easier for the HERDC returns to be partly completed with pre-populated forms, and thus we would all save time and be able to spend more time on teaching/research.

Why so many theses I asked the Repository Manager? Because it is compulsory for students to deposit their completed theses, there is a Mandate for them to do so.

6.2 JUPITER UNIVERSITY

The IR at Jupiter University came about through an entirely different enactment of relations from those at Janus University. At Jupiter University a senior member of the University at the level of a DVC (DVC) was translated early in the evolution of the OA movement to the OA vision and to the role of institutional repositories in enacting that vision.

6.2.1 CREATION OF ALLIES, PROGRAMS OF TRANSLATION

How did OA come to Jupiter University? The Literature Review reveals OA activists such as Stevan Harnad, Peter Suber and the computer scientists at the University of Southampton, who have conducted research, written journal papers, presented conference papers, and developed software to support OA IR around the world. Their words, their actions and their enactment of technologies work to align others across regional, organisational and disciplinary boundaries into the OA IR actor-network. Several of the human actors interviewed indicated how they were translated by these activists.

...But if there was a moment which pushed me into action, it was listening to Stevan [Harnad] in the middle of '02 ... [who had] quite far-sighted views about the way that the refereed researched literature might be made more available ... when you think about it, [OA is] just a simple case of people wrestling with what they saw as changes in the physical world that might be generated by these early developments with the internet ... [DVC].

I'd been following Stevan Harnad's writings, and I was very keen on being involved in this area, I put my hand up straight away to say that it's got my name on it [Repository Manager]

An example of Stevan Harnad's "far-sighted" writing

With the online age, it has at last become possible to free the literature from this unwelcome impediment [toll-gated access to research findings aka journal subscriptions]. Authors need only deposit their refereed articles in 'eprint' archives at their own institutions; these interoperable archives can then all be harvested into a global virtual archive, its full contents freely searchable and accessible online by everyone....

... researchers can hasten the optimal and inevitable outcome without any sacrifice or risk. The entire refereed journal literature can be freed, virtually overnight, without authors having to give up their established refereed journals, by a method that a portion of the physics community has already shown to work...

Distributed, institution-based self-archiving benefits research institutions in three ways. First, it maximizes the visibility and impact of their own refereed research output. Second, by symmetry, it maximizes their researchers' access to the full refereed research output of all other institutions...(Harnad, 2001)

After his own translation to OA through IR, the DVC worked to translate Jupiter University actors into allies of the OA IR network. As a senior member of the executive of the University he worked to align other Jupiter University actors with the OA IR actor network.

The enrolment of Jupiter University was made easier by the alignment of the OA vision with the Jupiter University vision. Jupiter University has a publicly stated vision which:

“aims to strengthen its distinctive national and international reputation by combining academic strength and practical engagement with the world of the professions, industry, government, and the broader community”. It cites as among its five key goals those of “building research capacity”, strengthening [Jupiter University’s] position in teaching and research “through better partnerships across internal and external boundaries”, integrating ICT into all functions, including research and to develop an “environment that will foster and reward high-quality scholarship and that build a sense of community” [Jupiter University web page “Visions and Goals”].

Research and the promotion of research were therefore central to the university’s goals. The development of an OA institutional repository fits clearly into three of the five goals, in ways such as enabling access to research across internal and external boundaries and integrating the relatively new ICT of OA repositories into research. The University’s formal vision and goals were mobilised in such a way as to support human actors introducing the idea of an OA IR.

I mean I can say really clearly now that the research e-prints server at [Jupiter University] increases the impact and visibility of [Jupiter University] research full stop. That is absolutely aligned with institutional goals. If we try to put it up as some mish-mash of half thought through possibilities for use, (a) it wouldn’t be performing that function now, even if it was successful as a thing, (b) it’s more likely to have not got the support [DVC].

For this actor the issue was clear. OA institutional repositories were good for research, and for his university there would be some advantage in being an early adopter. The OA vision tied in directly with the university’s mission and goals. He recognized that the road to implementation of the repository and translation of actors might not be easy, but also that translated actors in turn would work towards translating other potential actors for the network.

... I think there might be some people that have been coaxed, tugged along a path as it were and then they get into it, and then they become advocates of it themselves. [Professor of Chemistry] is the best example of that... [DVC].

At the same time there was clarity about what the repository was NOT:

It was absolutely fundamental as far as I was concerned, that we not contaminate the repository for research by some woolly thinking about learning objects or teaching purposes [DVC].

The DVC was initially interested in the big picture and actively sought to enrol and interest other powerful actors as early as 2000 to look at possible changes to the scholarly publishing system that might be enabled by ICT. He was influential in organizing meetings where the proponents of OA, researchers and the people who manage universities and scholarly publishing could come together to discuss ways forward. He also engaged in discussion with two big European STM publishers. The publishers had two levels of concern. One was economic self-interest but the other concern was that the quality processes involved in

publishing would somehow be eroded by OA. The DVC realised that waiting for others to take action could mean waiting forever. For him the turning point came in 2002 at a National Scholarly Communication Forum which had Stevan Harnad as speaker:

... his opening parable really made me even more determined, not to wait for things—until that, what I'd been saying to people up to that point was, look there is going to be some kind of shake down in your midst but we've got the benefit in Australia of not having to worry about that too much because the epicentres of publishing are northern hemisphere based, particularly European centric and there is some big changes there and we'll be, as those changes occur, we'll pick up the benefit of that. But after I'd been to that forum, I thought no, it's not good enough we really need to get moving within the institution side; initiate some informal discussion among senior colleagues [DVC].

So he decided to mobilise within his own university:

I did a little bit of sounding out. So I went and talked to faculty research chairs before I did the submission to the research committee [DVC].

Returning from the Forum the DVC took a proposal to the research committee, of which he was a member, to develop a Jupiter University policy mandating the deposit of pre- or post-prints in an institutional repository. It went through the research committee unanimously. It then went on to the Academic Board and went through there with no difficulty. The Mandate was passed at the end of 2003 in parallel with the development and implementation of the repository technology and has been revised once since. It is referred to by all actors as “The Mandate” but in fact it is a policy of the university which clearly states what the purpose of the IR is, what is to be deposited (the “corpus of refereed research literature”), and that authors are responsible for loading up their own work, and the University Library for the management and maintenance of the IR.

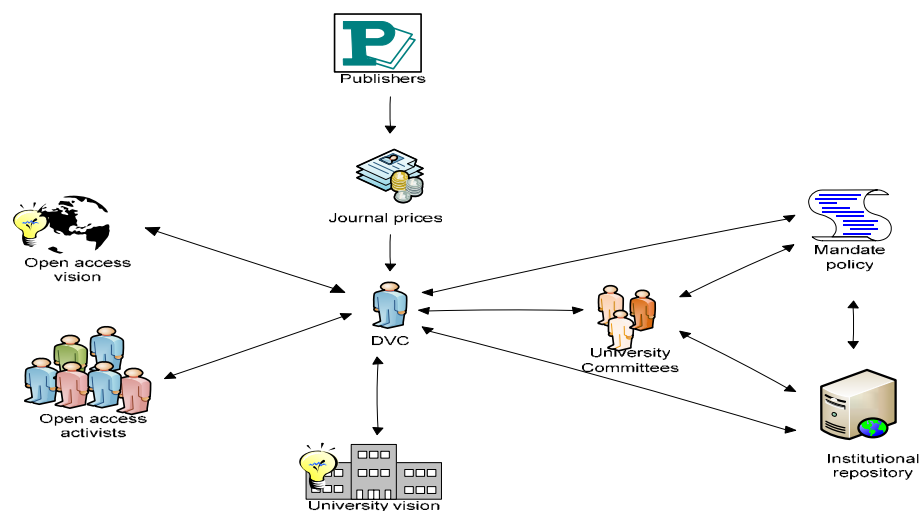


FIGURE 6-8: BEGINNING TO BUILD THE NETWORK - JUPITER UNIVERSITY

Thus two micro actors, the University Vision and the DVC worked together with the OA vision to produce a third micro actor, the Mandate. These three micro actors speak on behalf of the macro actor, the university.

POLICY F/1.3 E-print repository for research output at [Jupiter University]

1.3.1 Application

[JUPITER UNIVERSITY] staff and post-graduate students produce research and scholarly output as a contribution to their discipline and/or as part of scholarly discourse. A significant proportion of this is intended for publication for the general purpose of recognition and impact. The following policy applies to this process, only where such output is not intended for commercialisation or individual royalty payment or revenue for the author or [JUPITER UNIVERSITY]. In effect it applies to the corpus of refereed research literature, conference proceedings, and other non-refereed output, as contributed by [JUPITER UNIVERSITY] to the outside world.

1.3.2 Policy

Material which represents the total publicly available research and scholarly output of the University is to be located in the University's digital or "Eprint" 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. The following materials are to be included:

- refereed research articles and contributions;
 - at the post-peer review stage (the accepted draft - also referred to as the postprint);
or
 - at the pre-peer review (preprint) stage, with corrigenda added following peer review if necessary.
- un-refereed research literature, conference contributions, chapters in proceedings, etc (the accepted draft).
- theses as prepared for the Australian Digital Theses (ADT) process.

Access to these contributions will be subject to any necessary agreement with the publisher.

The material is to be organised in the repository according to the same categories used for the reporting of research to DEEWR.

Material to be commercialised, or which contains confidential material, or of which the

promulgation would infringe a legal commitment by the University and/or the author, should not be included in the repository.

1.3.3 Responsibility

Uploading of material to the E-print repository is the responsibility of authors and researchers, as advised and supported by the University Library. Responsibility for management of the repository rests with the University Library.

Where authors or researchers maintain home pages, links should be provided to the article or document which has been submitted to the University E-print repository.

1.3.4 Operational Guidelines

Guidelines specifying the lodgement points and the process to be followed for lodging materials in the E-print repository are available from the University Library. Guidance on Copyright arrangements and standards for publishers is available from the University Copyright Officer. The Director, Library Services will report annually through the DVC (Technology, Information and Learning Support) to University Research and Innovation Committee and the Office of Research on the status of the E-print repository.

The IR officially opened for business in 2004. As of August 2007 when the interviews took place Jupiter University was the only university in Australia with a mandate at that level, although mandates have been increasing apace at the local and international level⁴⁸.

A brief history of OA mandates

An OA mandate is a requirement by an institution or funder that researchers deposit a copy of all their published works in an OA repository. Jupiter University introduced its mandate in 2003, effective as at the 1st January 2004. It was the first university level OA mandate in the world (Suber, 2007). The institution of mandates world wide and in Australia has been slow, but gathered momentum in 2008 with faculties in prestigious institutions such as the Harvard Faculty of Arts and Sciences instituting such a policy on February 12th 2008 and the Faculty of Law following suit in May 2008. Stanford Faculty of Education joined the growing number of OA Mandates in June.

Research funders have also instituted mandates, for example the Wellcome Trust (Oct. 1

⁴⁸ Registry of Open Access Repository Material Archiving Policies (ROARMAP). <http://www.eprints.org/openaccess/policysignup/>

2005); seven of the 8 UK Research Councils by 2008; the Swiss National Science Foundation (Sep. 4th 2007); and the US National Institute of Health (October 2007) (although this latter Mandate is being challenged by a group of publishers). In Australia, the Australian Research Council (ARC) from December 4th 2006 requests that fundees make their work OA or explain “why not”. 2008 has also seen a flurry of institutional level mandates in Australia beginning with Charles Sturt and Macquarie Universities. Mandates are likely to spread in Australia with the recent Innovation Report by the Federal Government containing recommendations such as:

Recommendation 7.10: *AS specific strategy for ensuring the scientific knowledge produced in Australia is placed in machine searchable repositories to be developed using public funding agencies and universities and drivers.*

Recommendation 7.14: *To the maximum extent practicable, information, research and content funded by Australian government including national collections should be made freely available over the Internet as part of the global public commons... (Australian Government Department of Innovation, 2008).*

And backed up by the minister’s speech:

The last big idea in the report I want to touch on is OA. It is embodied in a series of recommendations aimed at unlocking public information and content, including the results of publicly funded research. The review panel recommends making this material available under a creative commons licence through:

- *machine searchable repositories, especially for scientific papers and data*
- *cultural agencies, collections and institutions, which would be funded to reflect their role in innovation*
- *and the internet, where it would be freely available to the world. (Carr, 2008)*

As at the 16th September, 2008 ROARMAP⁴⁹ records the following number of OA mandates.

22 INSTITUTIONAL Mandates	2 Proposed INSTITUTIONAL Mandates
4 DEPARTMENTAL Mandates	3 Proposed MULTI-INSTITUTIONAL Mandates
27 FUNDER Mandates	5 Proposed FUNDER Mandates
53 TOTAL Mandates	10 TOTAL Proposed Mandates

As the mandate policy had been passed, its interests inscribed, binding the University and its actors to a program of action, different actors were delegated different roles. The library, even before the inscription of the Mandate had been delegated the role of technology implementer and Mandate enforcer. The mobilisation of the Mandate policy did not occur in isolation from

⁴⁹ <http://www.eprints.org/openaccess/policysignup/>

other activities. For example the Library could see the processes of translation occurring. They knew the DVC was working on mobilising the policy and as it came through:

it was quite a natural reflex for them [the library] to say, oh well he's done that and got the policy through now we implement it and the only thing we really need to talk about was funds [DVC].

The Library would be the location for the OA IR and would provide it with human and technological support. The Library became involved because in the early days of the repository movement IRs were very much linked to the "serials crisis", and also that the OA movement and IR were inextricably tied together in discussions on scholarly publishing and scholarly communications which were very much in the domain of university libraries.

For the University Librarian, involvement in the IR project took on some aspects of facing an interesting challenge, knowing that despite existing practices, changes in scholarly publishing were inevitable and these changes meant changes in Library work:

... our budgets and our allocations and our processes and our systems. Everything all set up around the traditional model of publishing. For university libraries to move it's going to be a challenge ... I think we're in a state of flux. Who knows which way it will go? But I know that from this organisation's point of view, we're certainly going to encourage the OA and we've got strategies built into our strategic plan for next year to continue to explore and raise awareness of OA and changes with scholarly publishing with our academic staff and researchers. ... There are some, there are various different models popping up all over the place. What we have to do though is to think well creatively and think outside of the box. I don't know whether university libraries are doing that just yet [University Librarian]

The University Library was further enrolled by seeing the provision of the IR as an extension of the library staffs roles as information managers, managing information contained in the university's research output and information about the university's research output:

I don't think our role will change in that ... we're information managers, we're information consultants. We're experts in information. But how we do it will change. ... But our ultimate role is to help people find information, evaluate it, access it, and put it together in a meaningful way. I think there's still significant scope for the libraries to play a role. So I'm not worried about OA meaning oh we won't have anything to do. I think we'll still have lots to do and [Repository Manager's] role is a very good example of that [University Librarian]

Library staff and key repository actors see provision of resources and services such as the repository tied into an evolving and changing role for libraries. The library was enrolled by the DVC and the OA vision to the IR. The IR then assisted in creating new ways for the library to envision itself and its role:

I think that in the past, a lot of the focus was on building collections, and managing them, and providing access to them – so the library was a place where the collection was basically. ... I think we are still in the business of managing information resources, but they're not necessarily print ... They may be managing access to digital collections that are elsewhere ... So, I think we will also be involved more in the creation of the intellectual output of the universities ... So I think that this could be anything from scholarly publishing, the e-prints, the data management, the digital collection of image collections or historical resources, our research collections, and the library is going to have a role to play in that – but as we build up in this area, I think we will have to be giving up some of those other things that we do ... I think we'll also ... we become more of a place where the students come to meet, to work together, to collaborate, but not necessarily to use our collection... [Repository Manager].

Funds were made available for a “couple of years”. There was a strong systems group in the library that made a decision to go with the free open source EPrints repository software out of Southampton.

...as so often with the technology, once you've actually got things sorted out in a sense of what you're going to do in business sense, the technology's not that difficult and in this particular case the software was available through this freely available service. We're simply using the same technology as had been developed in Southampton and was being used increasingly. So that was really a tenth order issue. What was more important was a talented person having the necessary conversation with academics and [Repository Manager] obviously did very well because it just started to grow [DVC].

The Repository Manager also indicates that the technology wasn't difficult. The Library Systems Manager looked at the only two real options available at the time, which were DSpace and EPrints, and made a decision to go with EPrints because there was less technical skill required for the installation and there seemed to be less of a maintenance issue. Servers pre-existed in the library. Installing the software wasn't too hard, even without documentation (it was early days in the development of IR), a custom interface was constructed and some minor “tweaking” performed, particularly of metadata fields.

Introducing myself – ePrints: an Institutional repository

I am named after the EPrints free software on which I am built. EPrints is a flexible platform for building institutional repositories. EPrints was developed by the School of Electronics and Computer Science, University of Southampton in 2000, and launched in 2001. When I was first installed at Jupiter University my software was still pretty new. I was installed by Library Systems staff onto existing servers in the library. There was no documentation and only a small community of users. The Jupiter University Repository Manager and Library Systems staff worked with what was available to get me up and going. A few tweaks here and there and a customized web front end and I was ready. Of course, since then I have modified and changed

as the needs of researchers and the university change. EPrints now has a thriving community who provide feedback to the developers with ideas and requirements. EPrints is continually being modified and improved.

As my developers say:

EPrints is both a practical tool and the crystallization of a philosophy. It enables research to be accessible to all, and provides the foundation for all academic institutions to create their own research repositories [<http://www.eprints.org/software/>].

The technology itself had to be mobilised to fit the needs of Jupiter University. This was an ongoing process, which will be evident as we progress the narrative, but an early example is:

There were no fields for the copyright information to be displayed at that stage. There was no information about contact details for the authors. So, quite a few things like that we actually were pushing, and as the publishers started putting conditions on the permissions, say yes, but you have to display this notice – we needed a field to display that notice like the IEEE so that went to the additional information field, which of course led to problems down the track [Repository Manager].

While Repository Manager and the Library systems staff were getting on with selecting, installing and testing the software, the DVC was continuing to seek allies in the translation process.

..., he was very keen for [Jupiter University] to show some leadership in this area, in terms of providing OA to scholarly literature. He was sitting on the University Research Committee, and Academic Board, so he made sure that all of the people on those committees understood the issues. So, that when the time came for him to actually propose the policy, it got a lot of support. That was actually endorsed in the September, just before we launched in November [Repository Manager].

Different reactions emanated from different faculties, for example in Education many researchers already had copies of their work on their web pages, and were keen to have access organized more rigorously across the university. Others were less enthusiastic, but no-one was “upset or unhappy at the idea”.

The DVC felt an enabler in the Jupiter University implementation was a relatively agile and flexible university structure although sometimes he met with resistance, for example;

...she sort of stared at me in astonishment and said, “... well that’s really, that’s too big. That’s too big an issue, how can you tackle that”? So in some cases there was recognition that there was something wrong but “how can we do something about it, how can you do something about it?” [DVC].

In this case it was seen as important to get senior decision makers on side. After the DVC had gone around the university enrolling and mobilising key decision makers to produce the

Mandate, Repository Manager's role was to get researchers interested and to negotiate the terms of their enrolment. Different strategies were used for different groups, and new strategies evolved as older ones were found not to work with particular groups. It became clear that members of Jupiter University were not part of a single, heterogeneous network, but that many actors belonged to multiple networks, within and beyond the University and had relations that were contingent and endlessly variable. Therefore the arguments used to encourage translation also needed to be contingent and variable.

The University celebrated an official launch of the repository, accompanied by wide distribution of brochures and the Repository Manager speaking to Faculty and School Meetings. Layers of support for researchers were provided through liaison librarians and in some schools, school administrative staff, who were actively recruited and "translated". The Repository Manager's initial position was a six month secondment. Initially it was thought that the repository software would just be able to be installed and got up and running, and after that it would run itself. The software would "be there" and scholars would just put their work into the repository according to the mandate as they wrote it or had it accepted for publication.

However, it was early days, and not many people knew what OA was about, let alone what an e-print was, or what the words pre-print or post-print meant, so it was decided by DVC, University Librarian and Repository Manager that a major communication program was needed. The Repository Manager's initial position was for six months to the end of 2003. This was extended for the 12 months of 2004, but at a part-time rate. By the end of 2004 it became clear that this was not a project position and became full time contract position for 2005 and 2006. During this time it became clear that *"I was not going to be able to support all 4,000 staff and researchers."* [Repository Manager]. The Repository Manager sought and gained the involvement Liaison Librarians as a repository network promoting and sustaining presence. And finally, while the mandate is not emphasized as this could be "counter productive" it is subtly introduced to translation conversations:

What I prefer to say ... is rather that it's tied into the promotion system – about when people actually apply for a promotion, they're asked to put their body of work forward as evidence, but it basically links into [the repository] ... Well, if it's not there then, you know, it's up to them what will appear in that list. So I think closing the loop, in terms of making sure that there are rewards for doing it, is important [Repository Manager].

Once the translation is complete for some researchers they can be asked to do more:

What I've found is that, once people are totally believers in the benefits, you can raise the bar. You can get them to do more, because they understand and experience the benefits, and they would hate to actually lose them. Therefore, you can ask them to do more [Repository Manager].

They, in turn, work to enrol and translate their colleagues.

It was Internet discussion, but I can't remember which. When I first arrived as a PhD student, there was quite a lot of discussion going on, and there was quite a strong movement, groups of people saying, 'We're going to set up our own journals and publishers stealing our copyright and getting all this money and we get nothing; you know, why should they make money out of the work that the universities are essentially paying for? So there was quite a lot of discussion going on, people talking about doing it, and new ways of publishing, and I can't remember which list it was on [Lecturer Design].

... my website used to just have links to my own manuscripts that hadn't been published and so forth, so people could track me down through my web page and pull out the journal articles. At some point in time [Jupiter University] decided it was going to introduce [the IR], and I'm not sure whether I was a pilot or whether somebody approached me or I just said I wanted to do it, but I think I got in relatively early and just went through the process of uploading the material [Professor Education].

Others heard about OA for the first time through the translation work of the Repository Manager:

Well, I heard about it I guess at staff meetings where [Repository Manager] has been ... so hearing about it there and sort of thinking that it sounded positive in terms of giving more exposure to your work and so on. And knowing that it was a part of [Jupiter University's] policy that we should be putting our publications on [the IR], but I didn't get on to doing it for years. I think I must have heard [Repository Manager] speak maybe two; three or four years ago the first time and I only just at the beginning of this year put my stuff on the ... repository. So it was just sort of not – thinking it sounded good in theory but just never really making the time to do it [Senior Lecturer Law a].

The main reason given for support of OA afforded by the IR is that it increases likely readership and therefore potential citations and influence. This reasoning is apparent across many fields.

The reason we are in academia is to generate information to disseminate knowledge and to provide that information to as many colleagues and friends and interested people as possible. I tend to see the journals as inhibiting that process to some extent, because people can't afford access to those journals. They're locked away in libraries, and particularly in the field of education, your audience is not necessarily academics who are sitting in university libraries reading the material. You want to get it out to teachers, to policy makers and practitioners. So OA provides free access to it, and the big journal companies aren't making a fortune out of my work, so I'm quite supportive of the whole process [Professor Education].

While some had not heard of OA as a movement as such, when explained to them they nearly all responded along the lines:

Not a movement calling itself as such. I'm definitely aware of the issues. It is one of these hot potatoes in economics. We're all for it but we don't do it. ... Well I mean the

profession of scientists are all for OA. The more people can read it with the least barriers the more impact we think we have so we don't want anybody to be excluded from reading our work [Professor Economics].

Not so much the movement but I was aware that there were a number of journals that were OA and freely available to anybody so that you didn't have to go to a library or be a subscriber to it to use the journal. And I've always thought that was a great idea because it means it's equitable to people who don't have access to university libraries [Senior Lecturer Adult Education].

So intellectually the interviewees were in favour of the concept of OA, citing not only the importance of providing the widest possible access to their research, but also the importance of knowledge being free, the notion of taxpayer funding of research, and therefore research should be available to all (taxpayers).

However, even from those who supported OA and the IR, there were always exceptions and provisos:

If someone, you know, funded by the taxpayer invents a fantastic thing that can be used in stem cell research or a new motor vehicle part something like that, it gets problematical doesn't it? ... They want to retain the intellectual property and be rewarded and yeah I think they should certainly be rewarded over and above giving it away but I don't know what the right formula for doing it is. We have patent systems which I think are kind of unfortunate and copyright systems which are really unfortunate in a lot of ways, but we live in a very imperfect world. I am much more a creative commons person than I am a copyright person. But as I said, I accept money from the Copyright Agency [Senior Lecturer Information Management]

However, while in favour of OA in principle were not in favour of the making of research output freely available without the existing journals and peer review system. They clearly saw OA as an adjunct to the existing system.

I'm totally for increasing access of this to the extent that the movement is [but not for] rejecting the authority of the quality control system of academic publishing. I'm not totally for it. If we just had this big repository and we dump everything there and we have no other quality control, then what every researcher sees and every piece of work they use it on to. Then I think they lose something [Professor Business].

So the researchers interviewed clearly saw the OA IR as the place to put a copy of their work to enable access to it after it has been through the quality and reputational hoops of the traditional journal system. However, even those who valued OA, were not going to enact OA as a matter of principal unless enacting OA also filled other criteria;

I don't think so, no, because I guess at my (early) stage in my career, I'm publishing where I think it's going to be most beneficial to me to publish rather than, you know, oh okay, is this going to help the industry [Lecturer Design].

Several respondents independently pointed out that asking academics about OA may be confusing. It is easy for them to conflate OA with online publishing in general, because when they are on campus they have easy click through access to all the electronic resources to which the library subscribes whether they search through Google, or some other search engine, or the library's specific search interfaces. So many interviewees believe that much of the scholarly corpus is already OA.

See a lot of us now are in the university everything is online and it is free online. I just click on to the university database and it is all there because the university pays the subscription fee. So asking people about free online availability sometimes can confuse people because to some academics free online is free online. You know what I mean [Professor Law]?

Translation was achieved for different groups in different ways. For example, for people who already had a view on OA, it was a relatively easy, if time consuming, process. For others, it was a process involving meetings, personal approaches, and reminders about the mandate to enrol them. A visual representation of the actors involved in building the Jupiter University IR is presented in Figure 6-9.

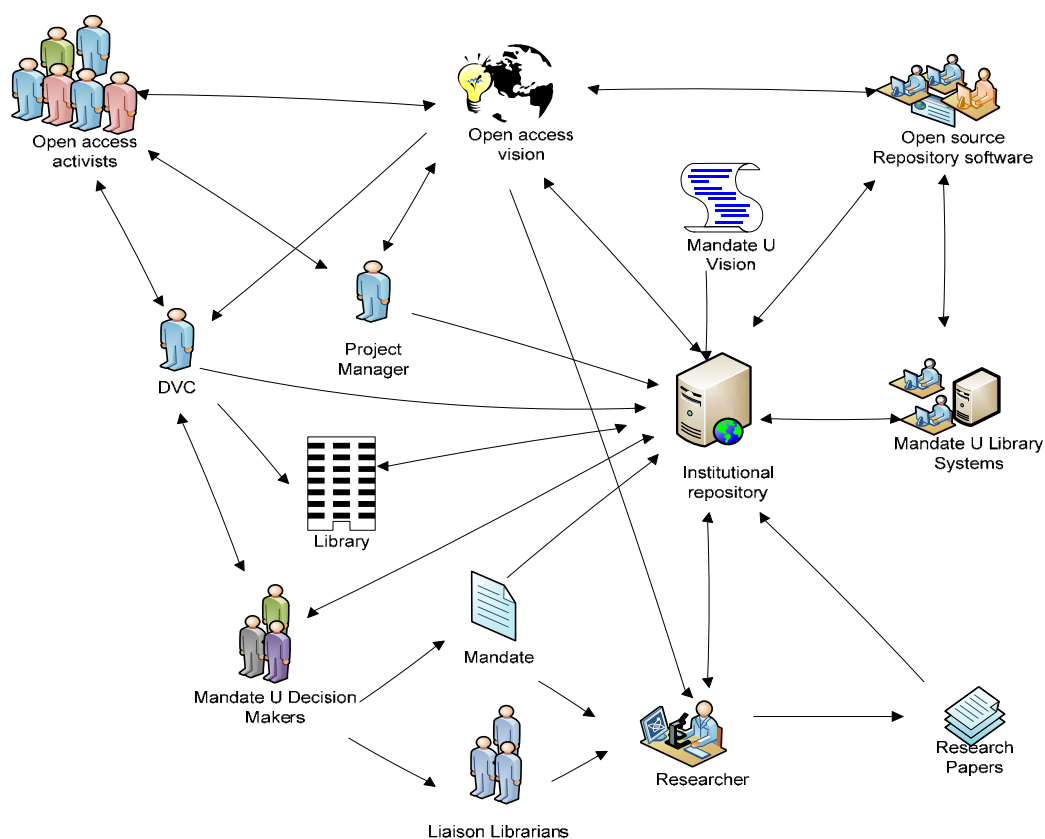


FIGURE 6-9: BUILDING THE IR ACTOR NETWORK AT JUPITER UNIVERSITY

6.2.2 ENROLLING RESEARCHERS

In common with the Janus University case interviews at Jupiter University revealed translation and anti-translation, programs and anti-programs occurring simultaneously. However, as we have seen in the previous section the Repository Manager realised that the situation was rich and complex and that actors and relations were contingent and variable, and thus she initially enrolled other actors as allies to support her later transformation work. We met some of these in the previous section, the Mandate policy, liaison librarians, the institutional repository itself, the OA vision, working with the existing publishing systems by accepting peer-reviewed papers thus countering the claim that the IR would be a repository of low quality, by enrolling researchers who were likely to enrol others, such as supervisors and heads of schools. Figure 6-10 illustrates the actors working in concert at Jupiter University to transform researchers and their papers into IR users.

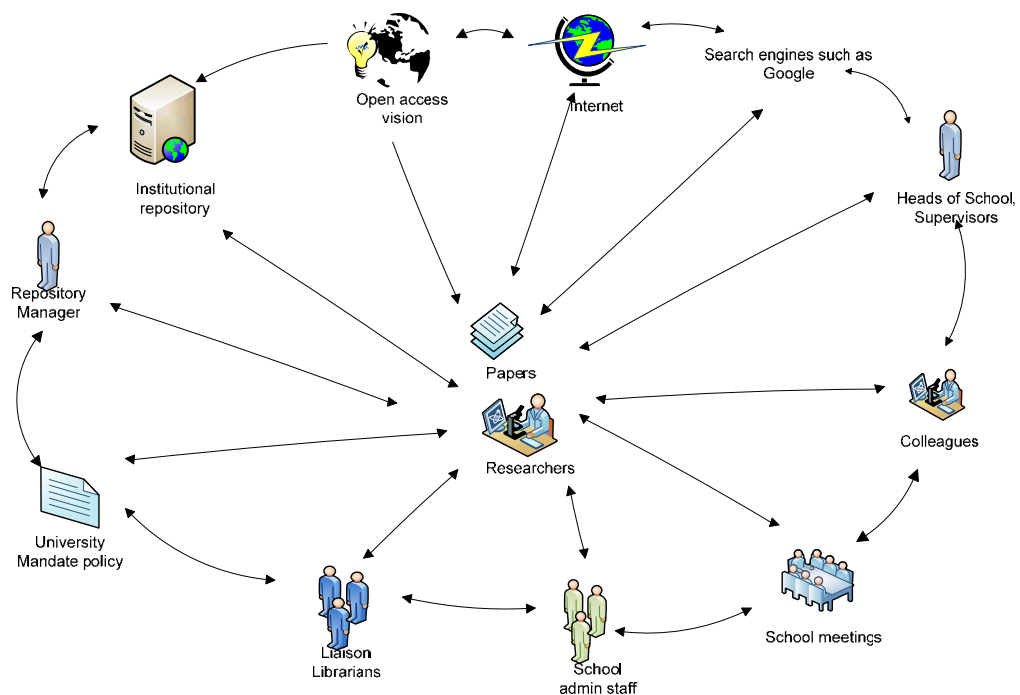


FIGURE 6-10: ENROLLING RESEARCHERS AT JUPITER UNIVERSITY

The Repository Manager and her allies at Jupiter University appeared to more clearly counter the anti-programs with counter-anti-programs. In the rest of section 6.2.2 below I describe what I found about programs and anti-programs following the traces of the actors and their programs. As mentioned earlier but this time in the words of the Repository Manager:

Initially I focused on the global benefits of OA, and the serials crises, and how many universities without good library budgets just didn't have access to sufficient resources, and that meant your work wasn't reaching other people. Over time, I found I had to continually modify the message to more and more what was in it for the researcher themselves. You know, in terms of – sure, it's kind of the same, but putting a slightly different spin on it, such that if people can't access your work, that's a problem for you as well as them, insofar as, the more readers for your work, the more citations, but I had to try and bring the relevance back to their own situation, to make it seem a high enough priority to actually get them to do something about it. Otherwise, it was one of those things that, you know it's a really good idea and someone should do something about it, but I'm too busy right now and I've got all these other things to do. [laughs] As soon as people can see that it's really a problem to them, that they might start to lose if they don't do it, and benefit if they do personally – it's not just people in third world countries, and the institution, and world peace winning – the deposit rates started to go up, sort of slightly. However, still within that first twelve months, the total deposit rate was a lot lower than I had anticipated – I think we got about 400 documents in the entire year; I'm getting about 300 a month now, so that's kind of the difference [Repository Manager].

The Repository Manager took an extremely active role as a mediator for the translation of researchers. At the outset she was optimistic, but as researchers did not flock to deposit their work in the repository she experimented with different techniques for translation, from putting work from existing Faculty web sites into the repository, to evangelizing at staff meetings using the Mandate as support or the benefits of OA where each seemed appropriate.

I would approach the Head of School, saying look, I need to come and talk to your staff about the new e-print repository policy. And how could they refuse? [laughs] ... by the time I started going out to talk to the schools and do presentations, ... I was able to say, "this is a policy". However, while I did make a big deal of the policy to the Heads of School, when talking to the actual staff of that school, you know, the academics themselves, I was very careful not to say, I've come here to tell you that it's been mandated that you must do this. Then, I would change the message to that OA is good, and these are all the benefits [Repository Manager].

More difficult than securing the Mandate was getting the researchers involved and adding their work. The Repository Manager developed a program to place some items in the repository so the launch did not announce an empty repository. The Repository Manager contacted researchers and offered to place their work into the repository. All were keen to have someone else do it for them, but there were problems as many had not kept electronic copies of their final version, necessitating scanning. This exercise unveiled some of the challenges that might be encountered after the launch.

In terms of getting some content there, I realised it would be impossible to sell an empty repository to anybody. So, I contacted academics who I knew well, and asked for them to give me some of their journal articles and conference papers that I could put into the repository, and they were all very keen to do so. So, unfortunately, many of

them didn't have digital copies, because they hadn't kept the final version, so we had to scan some documents, but anyway, we got about 50 papers in, in time for the launch in November. ... But, it [the mandate and the repository] basically became active from the January 2004. ... So, we started the New Year with our policy in place, and a communication plan to go out there to all of the schools, and let them know what it is, and why they should be putting all of their papers into the repository [Repository Manager].

In some ways the early documents in the repository took on the role of mediators, demonstrating the role the repository could fill for later researchers and their papers.

6.2.2.1 COPYRIGHT, LICENSING AND JOURNAL POLICIES

Many researchers at Jupiter University, in concert with their colleagues at Janus University, were uncertain about their copyright rights and responsibilities and therefore chose to view copyright as a reason not to self-archive their work. In the words of the Repository Manager some researchers:

... vaguely recalled they signed some legal document that the publisher flashed under their nose, but they couldn't remember the exact wording or what they had signed away, and what they had retained, in terms of rights, and they were very fearful of getting it wrong and getting into trouble. Maybe fearful is the wrong word, but they were concerned about copyright. So, I went away with the idea that a) we've got to make it faster and, easier, and b) we've got to be prepared to give a lot more help with the copyright ... what we've communicated to them is, if they don't know that [the copyright status] shouldn't stop them putting it in, because the library will always be checking, and that was always the case, before we even said that.

So a multi-pronged approach was instituted to counter the anti-program of copyright. The message was continually refined to reflect understanding of researchers concerns, practical assistance was offered with the process wherever it was possible and the repository itself was continually tweaked.

So the message became, look, it's a no-brainer for you, all you've got to do is deposit your final word versions – (forget the post-prints and pre-prints terminology) – your final word version of the article, deposit it, fill out just the mandatory fields if that's all you've got, more if you want to, the library will convert it to PDF, and we will enable a level of access that is consistent with the policy of your publisher. So we said look, in 90 per cent of cases that means that we can probably make it OA, but there will be some that we are going to have to lockdown, because when we check we may find that yours is one of the ten per cent of journals that do not support OA. ... there's a balance between making sure you're legally covered, and not creating a disincentive. How we've done that is we've basically said well, we'll get them to do as much as they can, before we've found that they'll stop doing it, and then we will make sure. So, we do the checking, and in fact, that's not nearly as time-consuming as you would think, because there are benefits in scale. We can look at some publishers and we know what their policy is [Repository Manager].

As a result, once scholars submit their work to the repository, repository staff checks the copyright status of the work. It gives researchers peace of mind and protects the organisation.

... it's relatively easy, and the whole copyright thing just gets done for you, which is fabulous. So, compared to a lot of our other systems, it's pretty good [Lecturer Design].

In addition to assisting scholars with their immediate needs to identify potential copyright issues in works they deposit in the repository, Jupiter University has a far larger project involving the Law Faculty and other stakeholders researching issues in OA copyright. The project also has practical outputs. For example as well as publishing guidelines on rights issues for scholars, they are working on producing a database of Australian publisher copyright policies to complement the international Sherpa/RoMEO⁵⁰ service in the United Kingdom.

So we do other things ... this is for the next publishing agreement in standard... all this is going to go on the website as well. That's more helping the publishers, so there'll be three functions in fact - there'll be authors, getting help, if we communicate properly that it's out there. Then there'll be their repository staff; and then there'll be publishers themselves. Well maybe there's a publishing agreement that would suit us as a choice. Or maybe there are some words. So we've been out there looking at templates, in author addendums; things like that will help authors and publishers get to that OA point. {Colleague} and I have talked about it and we figured we're in a really intermediate stage now, whereas the publishers have... There was an email here last week saying they've set up an organisation to be refuting all the OA - they've got a publicist [CopyHelp].

Fewer researchers at Jupiter University mentioned the difficulties with journal policies. It may be that the assistance they receive with their copyright activities means that they rarely have to think about journal policies. However, several researchers referred to particular publishers which have strict policies against copies of authors' work being placed in institutional or disciplinary repositories, some only allowing the practice after considerable time lags, if at all. However, generally they were so translated by the OA vision once they became IR users that they changed their publishing practices to no longer publish in those journals.

I have published a fair bit of stuff with [publisher] who don't permit it (self-archiving). I don't like [Publisher]. I am not going to offer them anything else again. I think they are great users ... [Senior Lecturer Information Management].

Another researcher had planned to rewrite her thesis as a book, however, the repository automatically made it available one year after submission, and publishers viewed the public availability of the thesis as a disincentive to "republishing".

[with regard to a PhD thesis] one is I had planned to publish immediately from it so I asked for a year's grace to publish but life got in the way and I didn't end up doing it.

⁵⁰ <http://www.sherpa.ac.uk/romeo.php>

So before I knew it, it was up there. I didn't want it for two reasons, one of which it intrudes on my ability to now publish on it because there's a number of places that won't publish anything that's already up on the repository. So anything that's up there has to be altered and restructured. ... in terms of book publishers I haven't even bothered because once it's up there it is not an original piece any more. So anything that's going to be published from it now, and I'm doing one piece now, is going to be an amalgam of bits and pieces from it because I've now lost that chance [Senior Lecturer Law b].

Sometimes however, the copyright issues are complex and more difficult to resolve, depending on the perspective of the actor involved. For example an academic copyright lawyer had reservations about making work OA. The issues she raised were copyright and related to plagiarism and re-use rights

...with the creative commons work there's a real push for the OA stuff and that's how I've heard about it and probably like a number of copyright lawyers have my own reservations about it. So it's partly being a copyright lawyer as well having a sense of disquiet about how people ought to use content [Senior Lecturer Law b].

6.2.2.2 TECHNOLOGY

The repository software did not always act in the interests of its own network stabilisation. In the early days the repository required documents to be submitted in PDF and many researchers did not have access to Adobe Professional or the interest in learning how to use it. The Repository Manager assisted academics in installing the free software PDF995. Some still found it challenging. But the implementers developed programs to address this. The repository staff offered to take the word processed documents and convert them. This turned out to have additional benefits in that the repository staff could take a document and ensure that it contained all the elements necessary to make it identifiable if were to be printed out, before it was turned into a pdf. This benefit means that the document is always able to be identified by the full citation.

Often, people – when we say give us your final collected draft version that you sent back to be published, they give you exactly that, and sometimes it does not contain the author names, it doesn't contain the source information; it just starts with abstract, or introduction [Repository Manager].

Researchers generally agree that the repository technology has to be easy to use and provide affordance to enable researchers to perform their work the way that best suits them. Sometimes the repository acts against researchers requirements, and therefore is its own anti-program.

Technology, that's everything. It has to be easy and you have to have an incentive to do it. For me I was in two stages that I put stuff on e-prints. The first was – okay I have some stuff that is early stage or hard to access. It makes sense to put it there. So I can find it somewhere. Then it was when I learnt that okay this is an entry point to finding my published work. So that makes a lot of sense to do that. But I think because of the

restrictions – I can't edit my own information the way I want. That makes it much less likely that I will get in to the habit of continually adding things to e-prints. So it will come in batches every now and then [Business Professor].

Further the repository technology does not enable researchers to remove work or replace it with another version. This can be done, but must be done by the repository administrator who must be convinced of the need to do so beforehand. This means that each article or other item, and its associated metadata, placed in the repository is viewed as an immutable mobile, when for authors, this may not be the case. Either the work or the metadata may have fluid characteristics. Researchers view this as a problem.

No but I mean the restricted access to this or that. With e-prints if I use them already to upload information there I don't think I can very easily change that later on. And my RA is not allowed to either. We have to contact someone [Professor Business].

With regard to actually submitting their own papers the general consensus of researchers was that the technology was simple and easy to use. However, as interviews progressed it often emerged that the technology itself was simple, but the way in which it was inscribed made it difficult to use. Several interviewees however found the deposit process full of complexity and unnecessary detail:

I'm not convinced that our [Jupiter University] ... repository is that user friendly, and I think this is what turns off some of my colleagues. What's happened with [Jupiter University] ePrints, it started off very simple, but now we have to fill in lines, like do you belong to this institute, does this paper belong to this research centre, so instead of just having the faculty there, you have this whole expanded lot, and then there was a whole lot of change made about copyright and originally we didn't put anything in about copyright, so all that came in. ... So what that meant was that filling in the [Jupiter University] [IR], to load up your paper now takes twice as long, because we have all these extra things to fill in, and also you have to fill in the RFCD codes. I mean, that's another time consuming thing. All that will put people off. You want to keep it as simple as possible. Instead of filling in lines, they might be better to have a cross or a tick or something so you can do it faster. I'm not convinced that our OA is as friendly as what it should be and I think that it could be made more friendly and I think they keep on asking too much. That's because it's becoming a management tool. Instead of being a library type thing or instead of being a researcher tool, once it starts becoming a management thing, that's when you get all this additional stuff you have to do [Professor Chemistry].

Some mentioned that the user interface was initially not the clearest;

... I think it probably puts some people off. ... it did put me off at first, because I tried to do it and something, I don't know what, went wrong, and then I probably would have left it a lot longer if I hadn't been pushed to do it. So I went back and did it, and after I'd done one or two, I thought, 'Oh, this is okay', so I don't know if that was a bug that got ironed out after the first few months or whether it was just something that I did wrong; I've never quite worked it out. But it's not perfect. My expert opinion is that it could be more user friendly, but it's a lot better than a lot of systems we have ... it's

okay. You've got to fiddle about cutting and pasting, and they've got a fair amount of nice little things, saying, you can do this; you can cut and paste into here and things like that. No, it's pretty good really, and I think it's been tweaked and improved as well since the beginning [Lecturer Design].

The technology has not remained the same throughout the whole process, it has adapted in response to users feedback, but also as the Professor of Chemistry indicates above, it has found itself new roles as a managerial tool, not just as a repository providing OA. It is changing its shape as it moves and may be better understood as a “mutable mobile” (Moser & Law, 2006 p.60). Some researchers still find it clunky despite its mutability. As a working repository, a working piece of technology it will always be changing to improve, to fulfil new purposes, to make use easier for its users.

Then if something is entered incorrectly – now ePrints has good Google properties and exactly how good Google pulls information from different sources, I don't know – but what would happen was because of our ePrints not entering my full first name and entering the wrong year of publication, my most cited work of all for I think a six month period you could not find by Googling my name. You could not find it – if someone wanted to see what are the most cited papers in this journal for this year they would not find it [Professor Business].

When talking about the repository researchers also seemed to almost automatically also include the IR's relations with other technologies such as search engines, most specifically Google. For example almost all researchers mentioned that if one Google's a Jupiter University author or their subject area whilst inside the IP range of Jupiter University, that author appears at the top of the results list. They generally credit the repository technology with enabling this. One reason many users were translated into repository users was that they found themselves near the top when they did a Google search on their topic or field. However, returning to my own campus I found that performing the same search produced different results. Although the Jupiter University repository results are near the top, my own university results were nearer. Google itself appears to act contingently. One regular user of both the OA IR and Google reported another interesting and fluid phenomenon related to Google;

One problem with it is, if you haven't done anything for a while, so if haven't updated for a while, it starts to drop down. ... I have this Google search which goes every couple of weeks. Of course, it turns up all my stuff as well as anything else that's there, and gradually my stuff drops down. If I go to e-Prints and put something on, it goes back to the top, and then it goes back down. So that's kind of weird. One thing I've sort of been planning to do a bit is put things onto e-Prints periodically so that I can keep myself at the top. Which means, of course, the latest stuff is not always up there straight away, which is a shame, because I'm thinking, I won't put it there, I'll just put this one, and I'll put this one in a couple of months so that it's always coming up at the top. I'm not sure why that happens [Lecturer Design].

Mostly, those researchers that use the repository report that they find it relatively easy to use and they appreciate the services offered by the library/repository staff, such as checking copyright,

It's relatively easy to get stuff up there. I can do it myself. I have control over that. And the fact that I don't have to worry too much about copyright issues and whether articles are legitimate articles that are put up there, because there's somebody behind the machine there that tells me if I've done something wrong, and that's fine. It's easy [Professor Education].

and resolving issues such as problems with names.

I do have a problem that sometimes I'm Jim and sometimes I'm James, because I publish under one name for historical reasons, so I've now discovered that I've actually got two entries, so they've done some fiddling and they've caught up with that ... I would think that's a problem for a number of people, to publish in different names and different initials and things like that [Professor Education].

However, others found the system more difficult and less intuitive, but were none-the-less transformed into the network as they saw a value and use for the repository. Interestingly some of these became allies within the network themselves, working to enrol their colleagues, and encourage use.

The only thing that I would say is that it is really sometimes difficult to – the first time you come to it, the way that its set it just doesn't make a lot of sense. It's not really intuitive. So that's why I sort of made the suggestion that I could help people put their things up because having done it myself and then working my way around it, if you have someone to sit there and help you do it just the first time, it does make it easier. It's just not intuitive at all. ... That's the only thing ... I think it's so critical, yes, because it puts so many people off. ... Some people just haven't got the time but even if they make the time and then they come to it and they've got five minutes and they just don't understand what that first interface is about, then they don't come back to it and you've lost them then [Senior Lecturer Law a]

6.2.2.3 ACADEMIC REWARD SYSTEM

Several of the researchers interviewed spoke about the academic reward system. How researchers do the research, write the papers, and review them for free and then publishers publish them and charge a fee, very often a high fee for subscriptions to read the journals. However, they nearly always say they go along with the traditional publishing system even although they recognize it as flawed, because of the academic reward system. Publishing in established journals is how researchers get a reputation which enhances their opportunities for tenure, promotion, grants and other benefits.

But the reason we're against it [OA and the IR] or that this doesn't translate into reality is that existing journals have got these parasitical publishers on their backs and as a young academic you've got to go for the reputation of existing journals. You can't

bypass it. You've got to send your stuff there and they ... just charge for it. But that leads to the crazy situation whereby we, for nothing, send our stuff to journals who then again, for nothing, ask referees to judge that work and they make money out of it. So we're all angry about it but the reputation and the need for reputation keeps the system in check. There are some moves to go against that. There is the ability of electronic presses, there are new journals being sprung up all the time with an OA regime so there are some moves but it is hard to go against this reputation mechanism [Professor Economics].

But they do not wish the repository system to replace the existing peer review and quality control systems. As stated earlier, the repository is seen as a useful adjunct.

... [authors] are horrified at the idea of putting anything out there that has not been through the peer-review process. In terms of the quality control, and the peer review, I'm not sure at this stage that [IR] have a big role in quality control, because really, it's the peer-review that is conducted by the journal, that is actually the quality control, and the impact factor of the journal is the stamp or the measure of quality, and we are, I suppose a little bit parasitic on that. Maybe that's too strong a term? It's a symbiotic relationship at best. We're really not providing that sort of quality control. ... At the moment, units of communication are still individual articles in issues of journals, so the role of repositories is constrained by certain things, but in the future it could look very different. ... providing the increased visibility and accessibility to our research outputs. So, we're going to reinforce the message [Repository Manager].

There have been a few who have said that they don't like open-access, or they think it's a threat to the journals, because some of the academics and authors, are also on editorial boards, and so they are members of other networks, for example the journal publisher actor-network. It has been expressed by interviewees that OA could be a threat to the journals, and some people equate this threat to journals with a threat to peer-review, which is seen as the key to scholarly quality control. Some people associate repositories with un-reviewed material, they perceive an open-access repository to be full of rubbish, and they don't want their good research output in there with rubbish. While some saw that this might mean the end of traditional commercial publishers, and that this might be a negative thing, others thought that it would be a good thing:

But I think that over time we'll piss the lead publishers out of this game and that's the major thing that the internet can do for us because it just reduces the publication costs. You don't need to have expensive typesetting. There's not a real issue in terms of storage space. You don't need an actual printer [Professor Economics].

Unlike interviewees at Janus University who have less experience with OA and IR, interviewees at Jupiter University did not necessarily see OA and IR as heralding the end of scholarly societies and associations. They thought it more likely that these associations will take control of their journals back from the commercial publishers. One researcher would prefer just to stick with the existing system, although he acknowledges that policies (in this case the

Australian Research Council (ARC) Funding Rules may force him to use the IR to make his work publicly accessible.

Better to spend our time getting on with new papers? I feel that our reputation is generated by good papers in top journals where they will be seen in the context of our discipline. The ePrints site has a mixture of materials some good and some not so good. ... I can see problems here because the ARC also now wants us to give access to papers published from grants funded by them so I guess that I will have to change my attitude!
[Professor Mathematics].

Policies, therefore, whether the institution's mandate or the mandate of funding bodies such as the ARC do influence the translation of researchers into the OA and IR actor-networks.

6.2.2.4 DISCIPLINARY NETWORKS

Acting against the easy acceptance of the repository is the importance of the accepted means of distribution of papers within the discipline. In fields where the disciplinary repository is strong, scholars resent the time taken to deposit their work in two places.

... the reality is that within our discipline everything is based on particular central recognised repositories like RePEc and SSRN and particular working series and otherwise it is all about people so you get to go to particular research groups or homepages ... I don't think there's that much mileage in university repositories
[Professor Economics].

Even where there is not an emerging tradition of OA disciplinary repositories, the argument is given that the disciplinary method of approaching publications through known actors (individuals or research groups) via the general web is more appropriate

I don't think that there is much of a tradition of eprints on uni servers in maths. If you look at [Jupiter University] ePrints then some of the leading people [names] have none. Others like [name] have lots. [Other University] has almost no maths preprints. [Another university] a few. Some mathematicians use the maths ePrint site <http://www.arxiv.org/> to make their work OA [Professor Mathematics].

So there is no argument against OA as such, more a desire to be associated with other leading people and to use the same method of dissemination as the rest of their disciplinary colleagues. There is also the natural reluctance of researchers to perform the same action twice, for example deposit to the IR and a DR or web page.

One author mentioned that in order to satisfy the Mandate and the expectations of his disciplinary community he self-archived his research output in multiple OA resources, for example in the IR, on his personal web page, in RePEc and on SSRN. There are both pros and cons to this strategy, possibly a wider audience, but there is a dissipation of downloads:

So I reach a large audience but this of course means that you sort of have spread your downloads and you've spread your hits as it were, so it makes you look less good at each one of them but you probably reach more in total [Professor Economics].

What he is aiming to clarify here, is that the hits on each repository or web site may look small in comparison to other scholars who may be depositing their work in only one place. This may have impact if downloads are used for performance measurement. From this Professor's viewpoint his disciplinary methods of distribution are more important for him than the IR and therefore the IR and its Mandate become an administrative burden. Like the researchers at Janus University he and others suggested that future development of repositories should enable more linkages to dispense with the requirement for multiple deposits.

Well within economics the only real use for it is either to give it more exposure than the RePEc or the other existing archives could give it, which is hard to imagine. The only other reason I can see is for administrative purposes [Professor Economics].

... maybe then you should have a system to channel this to other external repositories. So for me as an individual I would only have to put it in one place ... So you could have a box to click that said SSRN or a box that said RQF database. Yeah and then I could have a help function telling you what is this? What kind of disciplines does this cover? What kind of audience does this repository have and so forth [Professor Business].

I do think there's a real need to have some sort of linkage between key subject and institutional repositories. We'd love to see the AustLII subject repositories broaden a bit but we don't want to have to replicate it on every occasion. We don't want to have to put it in ten different repositories. We would rather it be in Jupiter University ePrints and for the repository to have some relationship with at least some of the other repositories we might suggest are important [Professor Law].

In terms of the different patterns of repository use and different levels of repository acceptance; it does appear vary between the discipline areas. In some areas where the articles are spread across a wide number, a large number of different journals, then scholars are keen to have their work in a single place such as the IR that is easily accessible and more likely to be seen. In other fields, those where the publishing output tends to be concentrated in a small number of journals with high impact factors, in other words where a tighter actor-network exists; or in a disciplinary repository, those scholars can't see as much advantage. People in those areas, they know that there's just these ten journals to read or to publish in, or a specific DR to check, and they're going to read everything that is really worth reading if they look at those. So they can't see as much of a benefit, as the areas, fields or disciplines where publishing is much more scattered or where disciplinary repositories do not exist.

6.2.2.5 OVERLOAD, NOT MY JOB, NOT MY CONCERN

Some researchers indicate they already have too much to do. For example, university collects the same data from them about their publications in multiple ways. They see a further use for the IR as the central place to collect this data and cannot understand why the university cannot use it in this way:

We've got to send in our stuff to five different accreditation and publication counting places and if the [IR] archives is the one central place where we put everything and everybody else takes it out from there that would be ideal instead of us having to be pestered five times a year and having to write it up in a particular format. That would be the use for me. ... They are still pestering us.... Not just the RQF but the DEST, the EQUUS, the AAMC, the Faculty Review. I mean it goes on and on and they all want it in a different format and at the end of the day someone comes knocking on your door and asks you to do it. So it is highly inefficient so if the [IR] can form that kind of central administrative role that would be a bonus [Economics Professor].

There were other reasons some scholars are not easily translated to repository users. Some reasons related to journal practices. For example changes made at the publishers galley proof stage where changes to the author's post-refereed copy would require a major edit and the author did not consider the benefit of having the work in the repository justified the considerable effort required.

ePrints does not work in general for us. There are often changes made by the editor when we get the galley proofs. For example, they want sentences out or figure captions changed or, as was the case recently, we had the some references in the list at the end of the paper (generated by BibTeX I think) but they did not appear in the text. I would have to go back to the LaTeX and find the references and remove them and then typeset the paper again. We also realised at the galley stage that we needed to remove 2 sentences to make the Conclusions make sense. The editor accepted this but this was still in the final version we sent them. Again another edit job. Lot's of work especially when the [co-author] is not longer at [Jupiter University] and they just send us the pdf rather than the original LaTeX. We just indicated the changes on the galley proofs and faxed them off [Professor Mathematics].

The point was frequently made that there are too few people in the institution building the IR actor-network and that people in the institution are feeling overloaded with work and this is just another thing to do:

I think there's probably an institutional issue about making it a policy of the institution that actually doesn't filter down. There's a lot of people who don't have their stuff on – even though it's an institutional policy to have that happen, a lot of people who don't have it on and I think, you know, the institution has one person, [Repository Manager], who just does so much hard work. She's got a team of people and everything but I don't know, I think that – well, say [another Senior Lecturer in Law] probably never felt brought into any consultative process or anything about the ePrints being ... One colleague the other day just said, was quite short. I offered to help her put her stuff

and she was obviously in a bit of a state with her workload and said “it’s the last thing I’ll be doing”. She came to me later to sort of go, I’ll look I’ve just been a bit busy, I’m sure when things settle down I’ll – but people are feeling put upon in terms of workload and perhaps they see it as just another requirement [Senior Lecturer Law a].

6.2.2.6 THE MANDATE

At first, even though Jupiter University introduced a Mandate, it was not enforced as such. The Mandate became an actor that hovered around in the background, ready to assert its agency where necessary, but leaving most of the work to gentler instruments such as persuasion and demonstration and the enrolment of actors who could see a benefit. The theory was that they then would enrol other researchers:

... once it got going, well I had a conversation with the library about how heavy a hand to lay on it and what I said was, look don’t, people are reluctant, don’t get into arguments. You can probably add the fact that it’s policy but if they’re really, really digging in, just move onto the next one and that’s basically what happened... There was a bit of hand holding in the system but once a certain momentum had been developed what happened was that our best researchers, that is the ones that were at the top of the matrix in the research world, the sort of people who would be there with an RQF assessment, they’d become, some of them have become our most prolific users of this. ... In fact one in particular, who’s quite a high profile inorganic chemist, just insisted his PhD students lodged their work here as they do it. It’s how you increase the impact [DVC].

When researchers were asked whether they would have been likely to use the repository voluntarily a range of replies returned. For example, some were enrolled in the OA IR to see whether the *famed extra hits materialise* [Economics Professor]. Others indicated they would have used the IR without the Mandate as they were translated to the OA vision. Yet others indicated that they may have used it for some papers, but not others.

[Without the mandate] Probably not to the extent that I have. I may have selected five or six papers that I thought were really probably the best that I’ve ever written and put them up but the idea is to put as much of your work as you can up, so I guess I’ve taken it on board to a greater extent in that I’ve got a lot more papers up because it is a mandatory thing. But if it was voluntary I probably would have selected a small number and left it at that. I wouldn’t have taken it on board so much [Senior Lecturer, Adult Education].

Would I have been likely to use the repository voluntarily? Absolutely [Professor Education].

It’s {Mandate} not really – it’s not enforced. I didn’t put them on until about a year or two ago. I just – because it’s a bit of an effort to actually get them uploaded and type in all the boxes and wait for them to get checked and whatever. So yeah I kind of did it off my own free will because everyone else was doing it [Research Student, Avionics].

Others reflect that not as many researchers would have taken up the IR without the Mandate Policy.

As you are aware where there is a policy in this place and I like the idea frankly. Not that you can actually get academics to do anything just because you have a policy. But I think there should be a repository of all research that's been produced in an institution. It's a really worthwhile thing to have and it should be a requirement that everything be deposited or at a minimum metadata for it [Senior Lecturer, Information Management].

Others thought the Mandate should be more strongly enforced because they saw a role the repository could have other than simply providing OA to the scholar's work. They saw that the repository could have a role in collection of information for various individuals for performance reviews and institutional reporting.

*Ideally it would be in everybody's habit that as soon as you have a new conference paper or if you call it a working paper, something that is ready to be presented in some context, that it should be there, it should be very easy to put it there. I think that is really important. **You should be incentivised to do it of course. That is also what I say about the RQF repository. That the way to do this is to let the individuals themselves enter the information and what is not in that repository when you have your PPRS as they call it; the review of your achievements.** What does not enter in to that does not count for any purposes that benefited... Then you have an incentive and yeah. Okay the roles. So they sort of have that role. So you put everything new up there so it is accessible... Make sure that what is not available in that repository that does not count when you want a promotion. That does not count when you want more salary. If it is not there it doesn't exist for these purposes. Easy enough [Professor, Business].*

6.2.2.7 THE WORKING REPOSITORY

Once researchers begin to use it the repository itself acts to further translate them. Satisfied researchers, through formal and informal means, then translate their students and colleagues. Those researchers who value the IR, and importantly place their work in the IR, find it provides unexpected benefits. For example, it saves them time, responding to requests for copies of their work. As well as giving their work visibility, it gives potential readers immediate access, and saves them time replying to and sending copies to potential readers who have found a reference to their work in another article or an index or abstracting service.

Something like OA saves me a lot of work. You have to understand that, because before OA, somebody would write to me and say can I get a copy of your paper, so then I have to shuffle through four filing cabinets full of papers. They're full of papers. Every one of those drawers is all full of papers, and I start stacking them elsewhere. Then I have to type up their address and I have to put the papers in and then send it off in the mail. But with OA, I can just say, look up [IR] and you can get a copy of the paper ... What I can do, I simply send an email back saying thank you for your enquiry, please go to the website [Professor Chemistry].

Others indicated that the IR assisted them to claim territory for work as yet unpublished in the traditional sense:

Well one example was a poster which was for an internal workshop here and the content had not been published before the conference paper ... I put it on eprints and in a way that's like publishing. It comes up on the Google search and that was a way of getting the research out there saying this is what I'm doing. ... Yeah putting my name to it and if anyone else sees that they can't start their PhD in the same area that I'm doing so I know that my topic is sort of guaranteed to be novel I guess and it's mine. So that is one reason I put say the poster there [Research Student Avionics].

Increased citations of works placed OA in the IR is reported in both speculative and empirical studies in the literature and also by some of the authors interviewed.

I think one of the things is probably increased citations. Some of my papers have been cited a lot and I think the OA to [Jupiter University] ePrints offers people easy access to your publications and therefore, it is more likely that they will cite your papers. It takes a while to catch up. The papers that are cited the most are the ones that were published 10 years ago, so there has to be some sort of graph that there's a time lag there. I think that the OA will minimize that time lag before your papers are cited. I think my papers are being cited a lot more now than what they were [Professor Chemistry].

The repository is perceived to have created the potential for increased readership, increased citations (in newspapers as well as other scholarly outlets), increased contact with others (potential colleagues and collaborators; practitioners and scholars) interested in the same field.

I think the core reason we write and research is to disseminate knowledge and I think having access to knowledge is critical and the repository helps us in that particularly in our traditional area of publishing which has been very much jurisdictional based. If I write an article it'll be read in the [Mandate] Law Library, it might be read in a few other libraries around the country but it won't be read in Germany or Spain or anywhere else in the world because they just will never get access to it. I think now that we have the facility for doing that, as I've said before, it's a shame. I think one of the critical things that the repositories give us is a global audience and dissemination at a minimal cost and that's invaluable. We've had experience where we've been cited in newspapers in Germany, we've had people from Brazil email us, we've really had people from all over the world come to us and say oh yeah we've read your material and where they've got it from is out of the repository. They would never have seen it before otherwise [Professor Law].

I think it's a good idea to have the ePrints repository up. I've been amazed that people I've never heard of who've contacted me from all around the world, Scotland, Switzerland, other places, who've said we read your article and have you written anything else? And that's really fantastic and it's very complimentary. So I think it's terrific that people would read your paper and perhaps if they had to go to a journal or they had to find it in a journal that it would take too much time and it probably wouldn't be the same. But the fact that they can just Google some words and there it is ... [Senior Lecturer Adult Education].

Counters displaying the number of downloads are popular. Download statistics provide positive affirmation that works are being read.

... there's a little sort of pride in looking at the statistics amongst the academics as to who gets to the top of the leagues table [Professor Law].

...because it means more people are reading it and that is a value in itself. If people read it or appear to read it because they download it ... that's terrific because it means that it has a purpose and it has gone somewhere. Otherwise you can write papers and not know if anyone has ever read them [Senior Lecturer Adult Education].

While people don't simplistically equate downloads with readers or citers, finding readers is an important part of the scholarly publishing process and making access easy can only be a good thing. A downloader is likely to be a reader. Researchers like the download statistics, while recognizing the problems and issues associated with them:

I think it's great. I think it helped me get promotion recently because I was able to say that this particular paper was downloaded X number of times. So I think it does – it does have some positive implications for promotion. I guess it's not quite the same as Google scholar, which is seen as perhaps another legitimate way of having people acknowledge your work because you can sit in your office and download your own papers on ePrints all day, which shows that all these people have accessed your work but it's really yourself. And I believe, well actually I heard, well I don't know if I could believe this person but I heard from this person that that particular person did that one whole day, just to get the ePrints numbers up and I said why would you worry? But yeah, so I guess you can't really take it too seriously that 9000 people downloaded your paper, but I think it is one measure of interest at least in your work. So perhaps for promotional purposes, it can have a role to play there [Senior Lecturer Adult Education].

Download information can provide more than just quantitative information. One researcher points out that looking qualitatively at what is being downloaded frequently can give a researcher indications about where interest in the field lies.

I look to see which papers have been downloaded to see where the interest lies. To me, that's very important, to find out where other people's research interests are. A lot of mine, they're all the same. I do look at the stats and I do look to see what papers have been downloaded and I look to see what abstracts have been downloaded. You don't see who has downloaded or anything like that, but I do look at the stats. That's interesting. But that's a time consuming process as well. People in my position don't get too much time [Professor Chemistry].

Others point to the discrepancy between download statistics and actual citations and postulate that this may be because downloads are being made by a potentially new readership, such as practitioners or other non-academic readers:

I've tried to understand some of the data that comes with the e-Prints, for example, the download rates and the abstract viewing rates, and then to look at other sources of citation, and there's a big discrepancy. When you go to ISI or things like that, you find your citations are nowhere near like what they are on e-Prints, and I suspect that's because e-Prints are opening up a window for another lot of people who don't write papers themselves, so the research might actually be hitting an audience which is requiring the research practically –Like school teachers. Some of the sorts of papers that are being downloaded the most; I wouldn't consider my best papers. They're not

my most academic papers, so there's a bit of imbalance. I think the academic papers and the ISI and the Google Scholar type searches are picking up articles that have been reproduced in academic publications and the academic world, whereas e-Prints may be being dominated by parents, families, community – so it is having an impact, and your research is establishing credibility in the community [Professor Education].

However, several expressed interest in knowing more about the downloader. Where were down loaders coming from? Were they coming from within the institution, within academia, beyond academia, commercial enterprises or other countries? Work the technology could perform for them would be to provide more detailed download information.

Researchers also like the timeliness of the repository, especially in areas where publishing may be slow, such as chapters in books. A paper, once accepted can go into the repository and potentially begin gathering readers straight away, rather than waiting for the paper or official publication process to take place.

We write books too, but the books are more for under-graduate teaching or more for post-graduate learning. That's a slow process, you see. We can't afford to wait four years to get a book published. I wrote a chapter for a book at the end of last year and it's going to be published in November, so you've always got this time lag, you see. One thing about ePrints is that there's no time lag. The stuff gets published and it's online [Professor Chemistry].

However, some scholars while appreciating the personal benefits provided by the OA IR also appreciate the institutional benefits.

I suppose I come at it though also from a perspective of thinking well our faculty and the school itself is needing to develop its profile in terms of research and it's part of the [Jupiter University]'s broader ambition to become one of the top ten research institutions in Australia which is a bit of an ask given the type of university that we are. So I sort of see it as having a lot of potential. And ePrints has a lot of potential in terms of raising the faculty's profile and all of those sort of things [Senior Lecturer Law a].

The repository provided further practical reasons for researcher to use it. Reasons that had not been the focus of the implementers (although several of theses reasons had been mentioned by the UL of Janus University as potential information management reasons for using the IR).

There is one advantage is having a second copy I guess as a repository but yeah for storage reasons, backup perhaps [Research Student Avionics].

*I think one **is backup**. ... if you've got your final version of the paper up there, at least you know if all else fails, and you lose all your copies of CDs and conference proceedings and your computer if, say, the whole building went up in flames or something, there's a backup when they're on the server, and I can still get them. So that's something. **And a record – it's quite a nice ordered record**. I know what's what and where. I've got 10 or 11 or something up there, and another few to come, and I'm already moving to, which one was which, and what was included in one, so it's quite*

*nice to be able to go and say, 'They're all there; I can see what's what.' Then **when you ask for a list of publications, the grant applications and CVs and things, you know it's there.** Also, it's **really convenient.** Whenever someone from a company or someone contacts you and it normally is from a conference, and says, 'Have you got any papers? Can I look at your work?' Also, media people – I've had a couple of media conferences. I did a radio interview this time last year, a couple of things like that. You can say, 'Okay, we'll just go here; this is one of my papers.' There's none of this searching for an attachment, a copy, fiddling about. You just go, 'There's the link; go there', and my papers are there. So it is convenient [Lecturer Design].*

But there was also another purpose for me, in that, as you look around my office, you see its chaos, so I need a system that actually organises myself, and ePrints is fantastic because it keeps documents in one place, and I can access them at any time. If a student comes in and wants to know something that I've published, well, I know where to go rather than trying to find a filing cabinet. I actually have another office in another part of the building that has about six filing cabinets full of manuscripts and things. Well, I've kind of done away with that... So it's a filing system for me. And that's probably as important a use as the fact that it's available publicly [Professor Education].

Another positive aspect of the repository that evolved for scholars was that the repository enabled them to put a link in their email or on their web pages which enable potential readers to click through to a list of their publications from which full text was mostly available.

I just have a generic statement and link on the top [of my website and outgoing email], "go to eprints, who prints most of this online" [Lecturer Peace and Conflict Studies].

Where once only a small number of early adopters utilised the repository, now most of the scholars in university do. For early adopters there were many perceived additional benefits, fewer users to scroll through, the chance of their work being on the web and freely accessible before the work of other scholars in their field. A benefit was also that the repository record can link to the published copy and appears to have excellent Google properties.

However occasionally the very feature that most researchers valued about the repository, which is the ability of potential readers to access research output caused others to be concerned.

The only disadvantage I can see is people stealing your research if there's any thing there that you know, international students from other countries, different language they just copy your research or something, I don't know, it probably happens. There is no way to track that [Research Student Avionics].

A further concern was that readers might stop short at the repository and not go to the "proper" article.

I think what I'm trying to suggest is that what people will do is that they might see and... Stop short. And go, well, that's there I won't – it might not be taken seriously is

partly what I'm suggesting ... Yes, and it's partly to do with this experience to do with what's happened to my PhD thesis that it's that sense of knowing that it has a ground and place; that I think ePrints even though they have a repository basis or an institutional basis, they're still informal. That's the part that really troubles me. I don't like them. I just don't like them [Senior Lecturer Law b].

Finally, even translated to support OA and the IR, may not change their publishing behaviour in response to the IR, rather they modify their behaviour to support what they see as the adjunct service proving additional access AFTER they have gone through the usual publishing processes.

...for ePrints, I wait until it's published and I actually wait until it goes into a thing called [SciFinder]. SciFinder is the chemical abstracts done by the American Chemical Society. When it's put into SciFinder, that's the point at which I would put the manuscript into [the IR] and I don't put anything up which hasn't been published or refereed. To me, it's a waste of time [Professor Chemistry].

6.2.3 JUPITER UNIVERSITY SUMMARY

Jupiter University enacted an OA IR and a policy to fill it early in the history of the OA vision. The presence of an actor in a leadership position in the university who had a clear vision enabled by enactment of a policy in the form of a mandate and a clear translation program about OA and IR influenced the implementation and trajectory of the Jupiter University IR. The OA vision complemented the University's existing vision. In his own words:

... people believed me. I had authority and credibility and [the position]... at the time. It didn't seem to be the library arguing on its own and it wasn't. I mean I was arguing this from the point of view of greater exposure for [Jupiter University] research. I also argued on the basis of this being an international trend. It's a university, which despite its size can be quite agile and make decisions quickly. We don't have, if I can just put it lightly, a stuffy old professoriate, where there might be such an addiction to time honoured ways of doing publishing that you just get a natural thing. Did we have, were there people who were querulous and concerned? Yes. There were. One of them was quite doubtful at the time but not enough to think that the arguments that I was proposing should be opposed, just that they should be concerned about them [DVC].

This actor saw his role as building and providing the institutional infrastructure (resources to implement a OA IR technology) and the inscription or "performative rhetoric" (Moser & Law, 2006) p 64 of the "mandate" for the OA IR, and then the role of translation of the scholars who were to actually use the repository was delegated to others, initially to a human actor, and an inscription or policy actor, the Repository Manager and the Mandate Policy, but eventually increasingly to the other actors whose work would involve extending the network.

The implementers saw the OA vision as a beneficial actor. Their belief and enthusiasm contributed to the enactment of the IR at Jupiter University.

– it's like a motherhood sort of statement isn't it? [laughs] How can you say it's not good? [Repository Manager]

In addition, at Jupiter University the anti-programs for enrolment to the IR network were more likely to be countered, or at least anti-programs were not as often promulgated by the same actors as those promoting the programs. Figure 6-11 illustrates that some actors which offered both programs and anti-programs at Janus University such as the University Library and Librarian, and the IR Project team, offer only programs at Jupiter University. In addition the Mandate Policy and search engines are enlisted to counter anti-programs.

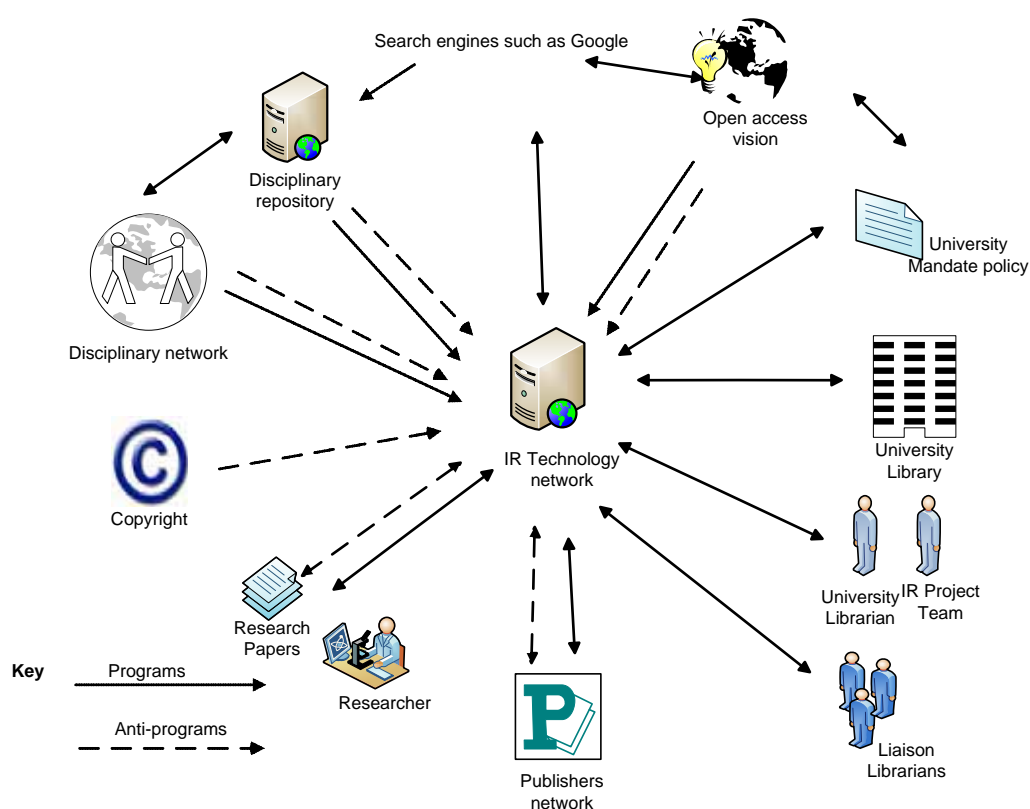


FIGURE 6-11: PROGRAMS AND ANTI-PROGRAMS AT JUPITER UNIVERSITY

There is not just one technology within one organisation that comprises the technology of the OA IR. Without the Internet and search engines, OA and IR could not exist. In many ways the ability of the Internet with its world wide network of inter-connected networks and computers and their users alerted actors to the possibilities of opening up the existing scholarly publishing actor-network. The scholars themselves were aware of this possibility for change.

... well because we know that we now have a tool through the internet to disseminate more broadly, we're very keen to see how we can utilise it [Professor Law].

For the OA IR team at Jupiter University, translation was a continuing process. To continue to translate the researchers they listened to them and implemented ideas that arose from researchers to enact better repository performance, which in turn would improve repository use.

The implementation team see that the success of the mobilisation and translation is tied into both having the support of the senior executive of the of the University and building good relationships with researchers, and to remember that *“researchers are very busy, productive people, who have got so many things to do, they have to make a decision about what they’re going to put time into* [Repository Manager].

In addition translation of researchers overtly used strategies of rewarding researchers’ contribution to the IR. Jupiter University uses a number of methods, such as by putting articles in the campus newsletter and newspaper or sending emails of congratulations to when people reach download or deposit milestones, or have good stories to tell about the repository, such as increase in citations or contacts with other researchers.

Mostly researchers became translated to the OA vision and the IR practice; however, they still wanted to continue to operate within the traditional scholarly publishing network.

But it doesn’t change anything that I do. It sort of, it’s an adjunct part of the process for me. It’s sort of an enhancement of my research practices that I might be able to get to a few more people. But it wouldn’t change my thinking about where I’ll publish or what I would publish or how I’m writing or any of that [Senior Lecturer Law a].

So we can see how the actors work to translate the scholars into users of the OA IR. As well as creating a new OA IR actor-network and translating the scholars the OA IR; actors at Jupiter University are working to align the OA IR network with the existing scholarly publishing network, to encourage it to “interweave” (Mol & Law, 1994). The actors that we have followed who are visibly performing this work of translation are; the human actors, DVC and Repository Manager and the individual liaison librarians, and indeed the scholars themselves (once translated they seem very good at translating others); the organisational actors, the University library, The Mandate Policy and the various committees introducing the mandate; and the technological actors of the repository itself, the Internet and Google. These latter two illustrate not just heterogeneous the network is, but potentially how borderless (Briers & Chua, 2001); not only the network but the organisation of Jupiter University. We can see that creating network allies, or connections is not easy (Latour, 2005) p132 – it requires effort. The actors have worked hard to achieve translation. We have followed the actors to see how the

implementers of the repository have been performing the work of translation, making the network connections of the OA IR “stick”.

6.2.4 JUPITER UNIVERSITY POSTSCRIPT

As I had checked up with JanusWorks on 16 October 2008 I thought I should also check in with ePrints. ePrints had 1,895 deposits listed for 2007 (3 theses) and 903 (2 theses) for 2008. Jupiter University has a far smaller number of HERDC reportable items, around 1,800 in 2007. Correspondence with the repository Manager indicates that deposits often come in at the end of the year as researchers “clean up” or throughout the next year as journal embargoes cease. Her correspondence also indicates that for the last three years their deposit rates of HERDC reportable items are at about 75%, far better than the deposit rates of 11.3% (Björk et al., 2008) reported elsewhere in the literature.

6.3 CHAPTER CONCLUSIONS

Differences between Janus University and Jupiter University in terms of the introduction of the IR and the enrolment of researchers are clear. Janus University treated the Repository project as a research project. Consequently they commenced the implementation with a lack of clarity of vision and using software that was still under development. The implementation of the repository turned into a software development project. Jupiter University, on the other hand, was absolutely clear about its vision, its relationship to the OA vision and the role it wanted the repository to play. It implemented software that was ready to use although not perfect. Jupiter however was prepared to flexibly adjust the IR software according the researcher needs and software releases and development.

In both universities stories from researchers were similar, although those at Jupiter University were more familiar with, and supportive of, in a performative way as well as a verbal way, the OA vision and the use of IR. In both universities researchers inhabit more than one network and their habitation in multiple networks often conflicted with their use of the IR. In addition to the requirements of the disciplinary networks and the traditional scholarly publishing network other examples of this multiplicity of network membership emerged in the interviews. Several researchers, while supporting the OA vision, were concerned that the enactment of OA through IR or even DR may disrupt and disadvantage learned societies and associations. Examples cited were where access to papers was an incentive to membership or where the society made a profit from journals which were then used to subsidise other society activities. It was felt that widespread adoption of self-archiving may lead to the demise of journals. Their

membership of the networks of these societies, of the traditional publishing network, and potentially of the OA network created conflicts they found difficult to resolve. In universities some researchers wanted the IR to perform multiple functions, for example they're already required to report their research for the DEST collection, for the HERDC collection, and now they're being asked to put it into a repository as well. Why can't universities just get the information from one place, preferably the repository?

However other interviewed academics understood that the university had to collect information, they didn't think the managerial function should be incorporated into the repository, it should be maintained as a research tool.

So what that meant was that filling in the [IR] to load up your paper now takes twice as long, because we have all these extra things to fill in, and also you have to fill in the RFCD codes. I mean, that's another time consuming thing. All that will put people off. You want to keep it as simple as possible. Instead of filling in lines, they might be better to have a cross or a tick or something so you can do it faster. I'm not convinced that our OA is as friendly as what it should be and I think that it could be made more friendly and I think they keep on asking too much. That's because it's becoming a management tool. Instead of being a library type thing or instead of being a researcher tool, once it starts becoming a management thing, that's when you get all this additional stuff you have to do [Professor Chemistry – Jupiter University].

Some do think that more change is inevitable in scholarly publishing, but that it is not OA, or institutional repositories, but something that we can't even envisage yet. Many interviewees didn't mention, or later even when asked couldn't envisage a different future for scholarly publishing, but some attempted to:

Even if some of the technology is there, those revolutions often take a very long time and there are aspects of the system that is difficult to find a solution... and I actually asked the publisher – he [unclear]. I was asking him about who will make a move in this new world and what will happen? He gave me an answer that I think was interesting and which is often true for revolutions based on technological basis is that his thing was that it is probably not one of the big well established publishers. It is probably Google or someone like Google who is going to create the other credible system. I was thinking about it again today. Probably it is Google who are going to try and they are going to get it almost right. Then it is something like post Google who is really going to get it right ... Someone like Google of course have the financial muscles to create an entire system that could be an alternative. Like Amazon, and could be able to run that at a loss for 10 years in order to capture the market for the future. ... But Google today is a giant. That is why I think that if they make a move to become the academic publishing system, well tomorrow they are going to be 20 per cent successful and then someone we haven't seen yet is going to be the one that gets right ... [Professor Business – Jupiter University].

In this chapter we see the implementation of the IR at Janus University that:

- Was treated as a research project and therefore not opened to search engines early in its life, researchers, feedback etc.;
- Was introduced by implementers who were ambivalent themselves about OA and confusingly promulgated anti-programs as well as programs for the IR;
- And was not seen as central to the programs of the institution;

And therefore struggles to enrol allies and become durable.

Alternatively, we find the implementation at Jupiter, while facing many of the same anti-programs from the traditional scholarly publishing and academic reward networks:

- Was seen from the outset as central to the programs of the university
- Provided feedback to researchers in the form of download statistics, and visibility on Google, Google Scholar and other search engines from the outset.
- Was introduced by implementers with a clear vision of OA and who enacted programs to counter the anti-programs from competing networks, including a mandate requiring researchers to deposit their research outputs.

The following Chapter Seven will discuss these findings in more detail.

CHAPTER 7

7 PROGRAMS AND ANTI-PROGRAMS: VISIONS, TECHNOLOGIES AND MANDATES

Using ANT to follow researchers and their scholarly publishing, we find that they participate in many actor networks in just this one aspect of their lives – their scholarly publishing: their university network, their disciplinary network, the traditional publishing network, their reward network, just to name a few. The stories surrounding scholarly publishing, OA and institutional repositories are complex and rich such as those discussed in Chapter 6, and not all of them can be followed and further discussed here. Those that will be followed contribute to the major arguments I will be making in this chapter which include:

- That the OA vision is an actor that plays a key role in OA uptake and institutional repository implementation when it is invoked due to its almost “sacred quality that makes it difficult for a rational person to be against” it (Briers & Chua, 2001, p. 242); that each human actor embodies their own version of the OA vision, resulting from their relations within their related networks; and that researchers and implementers enact their own incarnation of the OA vision when interacting with the IR;
- That the OA vision translated actors at Jupiter University. Their actions created the Mandate policy which works to transform the multiple OA Visions of the actors at Jupiter University into one Jupiter University OA vision; The Mandate is a kind of rhetorical macro actor who speaks on behalf of the University by translating the OA Vision, the University Vision and the IR technology into words eloquently expressed and calculated to persuade. It encourages, persuades, and entices, researchers to place their research outputs into the OA institutional repository. The Mandate, the OA vision and the IR technology form a close-knit network, seen as one strong and decisive actor. So that the Mandate increased its network beyond the boundaries of the institution and works with the OA vision to encourage the development of Mandates elsewhere;
- That the IR as a technological (material) incarnation of the OA vision is enacted on one hand through its relations with developers and policy makers, and on the other through its relations with researchers. The agency of the repository technology can be

seen in its relations with researchers as it attracts and encourages some to continue to use it and thus contribute to the reassembling of scholarly publishing. By making their research papers publicly available through the use of IR researchers are extending the OA network and contributing to its durability. Jupiter University ePrints is an illustrative example of an IR that built strong links with its researchers from its early days, being responsive and giving feedback not just to implementers, but to researchers. ePrints growing network that included Google and Google Scholar enabled researchers to make their papers searchable and findable world-wide. Researchers followed their download statistics and citations and perceived these were afforded by the repository and its OA properties.

- It is well established that researchers are not one, but many. There is a wealth of literature on their differing disciplinary cultures (and let us not even consider their individual personalities, national cultures, institutional cultures and so on), and my interviews support this. And yet repositories are one solution and often they have affordance for one particular type of research. In our case of Jupiter University we see a repository that evolves and changes in response to researcher engagement and feedback, working to enabled researchers of many disciplines to activate their own OA vision in their practice of scholarly communication.
- Institutional repositories are also (re)produced by relations between the OA vision, the Internet and services such as Google and Google Scholar (and disciplinary repositories) and thus play an important role in the extension of OA network and the reassembly scholarly publishing.

The discussion arising from these arguments contribute towards answering the research questions asked in Chapter 4:

How and why is OA reassembling scholarly publishing?

What role does introducing an OA institutional repository to researchers play in this reassembly?

7.1 SUMMARY OF THE STORIES SO FAR

In the first case beginning at Janus University, the Government Department is inspired by the vision of OA and the work of OA activists to make funding available for universities, or groups of universities to establish OA institutional repositories. Janus University joins with other universities and begins a research project to develop and fill an institutional repository.

However, its project is delayed. The repository funds are won in early 2004 and the repository is launched at the end of 2007, at least 12 months later than originally planned, the repository is not well known or used by researchers within the institution, and is seeking durability through a dispersed and weak network brought about through a mix of programs (advocating OA) and anti-programs (undermining OA) often confusingly enacted by the same actors. Another university, Jupiter University, has key actors influenced directly by the OA vision and OA activists, and within one year (2003) implements not only an OA IR, but also a policy, the Mandate, requiring researchers within the institution to deposit their research output into the repository. While researchers may or may not agree with OA or the Mandate, the repository has a high degree of visibility and a high proportion of the institutions research output is deposited.

The two stories indicate the powerful the mobilisation of the OA vision has played, particularly at Jupiter University, but also at Janus University where the initial weaker version of OA originally implemented is increasingly replaced by a stronger vision. As the Repository Manager at Jupiter University noted: *it's like a motherhood sort of statement isn't it? ... How can you say it's not good?* However, it is not just its mobilisation which is important, but also its relations with other actors in the building of its own network, and the shifting of alliances in related networks or “worlds”, such as traditional publishing, disciplines or fields, institutions and their delegates, and the IR's themselves and associated technologies.

7.2 THE OPEN ACCESS VISION

Budapest Open Access Initiative (BOAI)

An old tradition and a new technology have converged to make possible an unprecedented public good. The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the internet. The public good they make possible is the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds. Removing access barriers to this literature will accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, make this literature as useful as it can be, and lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge.

*For various reasons, this kind of free and unrestricted online availability, which we will call **OA**, has so far been limited to small portions of the journal literature. (Budapest Open Access Initiative, 2002)*

The most striking outcome of my investigation is the emergence of the OA vision as a key actor who recruits and works to retain all other actors – government departments, researchers, developers of IR, policy makers and IRs – to enact its mission of providing OA to research without limits. The OA vision is not an ordinary actor, it can be seen as a “virtual actor” who acts on and through human actors and technological incarnations (actors) by enacting and translating the ideal of OA into their relations in scholarly publishing. All human actors refer to an OA vision, although they may use different words to describe it and their individual relations with the OA vision differ. An actor’s relations with the OA vision depends on the other relations they enact within multiple actor networks they are part of. Furthermore, the OA vision is not only discursively created but materially realised through different repositories, including the IR investigated in this thesis.

The OA vision is a “virtual actor” as it is endowed with flexibility, adaptability, and responsiveness or fluidity. These traits enable its incarnation in different versions and forms without losing its identity. At Janus University the OA vision works with the actors there to produce one particular kind of technological incarnation and at Jupiter University, it finds different actors with whom to relate and builds a different incarnation in a different kind of network. Like the Zimbabwe Bush Pump (de Laet & Mol, 2000) it is multiple and not rigorously bounded.

The OA vision is real and persisting despite its different and sometimes less than faithful incarnations (such as JanusWorks that initially limited the type of papers to be uploaded to grey material). Although the various forms of OA currently available fully exploit powerful Internet and Web technologies, it does not take much imagination to see that we have not exhausted the OA vision’s possibilities of being. As an actor the OA vision is subject to continuous negotiation in its numerous enactments through various repositories. As such the OA vision is also a catalyst of relations among the actors in other scholarly publishing networks; it weaves together the researchers, publishers and users of scholarly output in new ways.

OA makes a difference (Latour, 2005). We have seen in our cases that the OA vision inspired many actors, from the Government Department in our Janus University case and the Deputy Vice Chancellor in the Jupiter University case to individual researchers at both universities to move towards enacting OA. The relations between the OA vision and other actors acquire form and attributes through the development, introduction and enacting of institutional repositories, by researchers depositing their work, for example. In some of the ANT literature,

despite the general concept of symmetry, and the use of the terms “actor” or “actant” for material, social and technological entities with agency in the network; certain actors, especially non-human actors, are often given other names, such as objects (Star & Griesemer, 1989), inscriptions, (Walsham, 1997), or mediators (Latour, 2005). For example Star and Griesemer (1989) developed the useful concept of boundary objects. Boundary objects are objects which are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They identified four types of boundary objects, standardised forms; repositories; coincidental boundaries; and ideal types. A further type, the visionary object, was developed and utilised in an ANT analysis of an ERP implementation (Briers & Chua, 2001) and ERP integration (Dechow & Mouritsen, 2005).

The OA vision shares some of the characteristics with the visionary object described by Briers and Chua (2001) such as high levels of legitimacy within its particular community, and the ability to evoke affective responses from a wide variety of people. However, it is my contention that it is not an object, it is an actor and it does not operate at the boundaries between networks, but that it is central to the changes occurring in scholarly publishing and therefore central to all the networks discussed here, for example scholarly publishing, OA, university, researcher.

Let us look at the visionary aspect of OA. Few of the researchers came out with arguments against OA *per se*. It does have a quality that makes it hard for the rational person to act against it (Briers & Chua, 2001). Examples of statements about OA as such include:

... OA I think it's a thing that we should strive for [Associate Professor Information Management – Janus University]

... I mean I'm a strong supporter of OA publishing models ... [Researcher Social Science of Medicine- Janus University].

... sounds like motherhood to me [Senior Lecturer Science – Janus University]

... I think it's a great idea [Professor Social Science – Janus University]

... The reason we are in academia is to generate information to disseminate knowledge and to provide that information to as many colleagues and friends and interested people as possible. ...You want to get it out to teachers, to policy makers and practitioners. So OA provides free access to it, [Professor Education Jupiter University],

... Well I mean the profession of scientists are all for OA. The more people can read it with the least barriers the more impact we think we have so we don't want anybody to be excluded from reading our work [Professor Economics – Jupiter University].

There's no doubt that the publicly funded, publicly accessible mantra is strong and is probably growing stronger [Professor Law – Jupiter University].

Only one researcher was opposed strongly to OA, and this was not on the grounds of access generally but on the grounds that OA afforded the potential for plagiarism and the misuse of copyrighted material. While other interviewees mentioned these potentialities, they thought that a public copy of their work openly accessible may actually work against plagiarism and misuse, by providing a copy of the work clearly associated with their name. The University Librarian at Janus University was the only other human actor who expressed ambivalence about OA and the role of the IR.

I still don't know that we have made the case [for OA] as persuasive as it needs to be. Others just think it is obvious that that's where libraries should go. I am still very open-minded about it. ... But I think, what I have detected here so far, I think is if you can guarantee stewardship, a way of looking after these things for the long term, I think that is very appealing to them. ... But I think my colleagues differ. Some are still very firmly in the OA camp. I haven't left it, I just don't think it's what drives institutional repositories and I think it's a very hard way to sell it within a university where publishing, particularly in a technical and professional university like [Janus University] where publishing in the best journal is what it's all about [University Librarian].

As he is the mediator of the IR to the university, this ambivalence is expressed in the OA vision presented to the rest of the university and in the affordance of the IR technology.

However, how researchers perceive and enact the vision is the product of their relations and actions in many other actor networks. In this thesis I am particularly interested in what role an OA institutional repository plays in the reassembly of scholarly publishing. Accordingly let us look at how OA is, or is not, enacted through its relations with the institutional repositories in the first of our two cases, Janus University. For example researchers who support the OA vision but do not deposit their work in OA IR point to the strength of the anti-programs of actor-networks which act against the program of action implied by the OA vision, such as the traditional publishing actor-network supported by copyright laws, journal copyright or licensing statements and academic reward systems. For these researchers the OA vision has not enrolled them in the OA IR. They perceive the anti-programs to be too strong. This is represented in Figure 7-1. The anti-programs are represented by the symbol I have previously used for publisher, but in this Chapter, this symbol represents all the anti-programs called into play by the traditional publishing actor-network and described in Chapters 3 and 6, for example copyright, licences and licensing documents, the academic reward system, and so on.

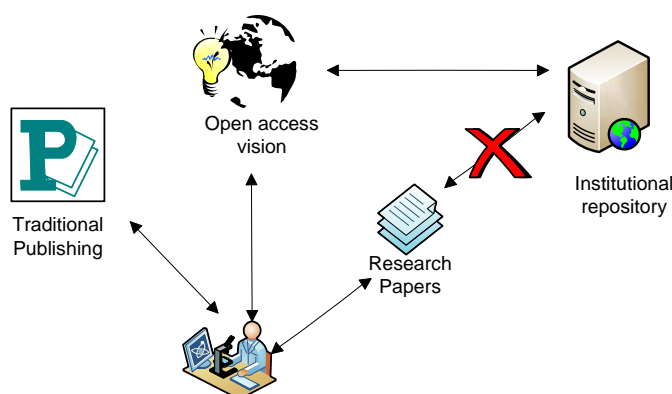


FIGURE 7-1: RESEARCHERS OA VISION MEDIATED BY RELATIONS WITH TRADITIONAL PUBLISHING ACTOR-NETWORK
– NO DEPOSIT IN IR

Other researchers equally enrolled in the publisher actor network were still able to be enrolled by the OA vision to the IR, but in a way mediated by the support of their disciplinary network for the distribution of research by means of grey literature. Their vision of OA therefore applied to grey literature rather than to a peer-reviewed version full text of authors' manuscripts. While not all disciplinary actor networks support distribution of, and OA to, grey literature such as technical reports and working papers, several do. We met some in Chapter 6 including various engineering and science disciplines and economics. The institutional repository has changed their behaviour by providing a place for them to deposit these works and for readers to access them. The traditional grey literature paper distribution mechanisms lost their durability and were replaced by electronic distribution and the IR, but papers traditionally published in journals are not translated to the OA vision by this group of researchers as represented in Figure 7-2.

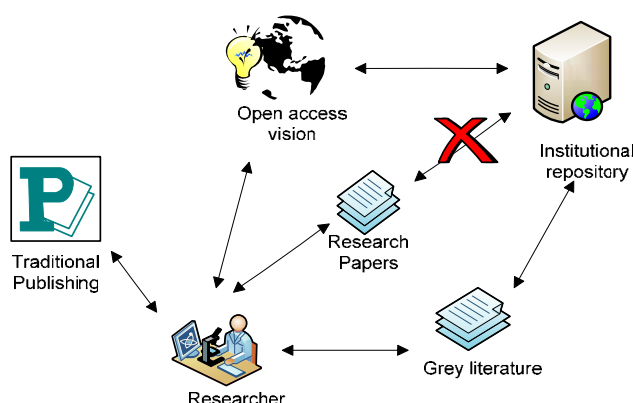


FIGURE 7-2: RESEARCHERS OA VISION MEDIATED BY RELATIONS WITH PUBLISHERS – GREY LITERATURE DEPOSITED IN IR

Furthermore the OA vision enacted in Figure 7-2 was that supported by the early implementation of the IR at Janus University as represented in Figure 7-3. While the implementers in the form of the University Librarian and Project Managers at Janus University had relations with the OA vision and the traditional publishing network, the programs of the traditional publishing network initially worked more powerfully for them as they initially implemented the IR to work with grey literature.

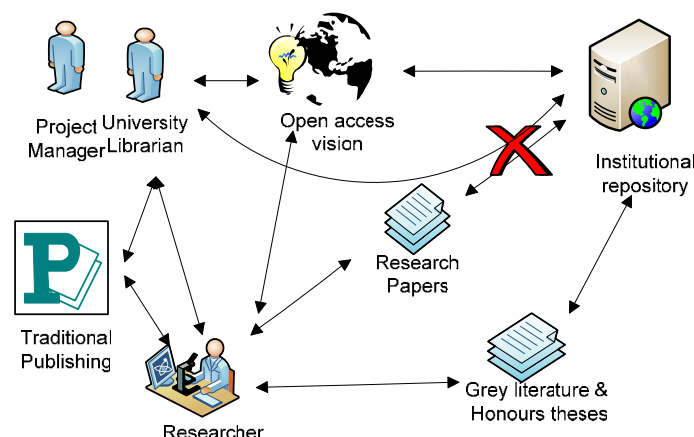


FIGURE 7-3: IMPLEMENTERS OA VISION MEDIATED BY RELATIONS WITH PUBLISHERS – GREY LITERATURE DEPOSITED IN IR

Yet other researchers adopt the OA vision through the lens of their competing membership of disciplinary networks. Examples include the Professors of Finance and Physics at Janus University and the Professors of Economics and Mathematics at Jupiter University for whom the OA vision is mediated by their relations within their disciplinary network. The disciplinary network, as a macro actor, aligns these researchers to it and binds them with a program of action which supports OA through disciplinary repositories rather than institutional ones. Thus they embrace the OA vision, but do not adopt the IR as illustrated in Figure 7.4. Work is being undertaken in other places to develop standard deposit mechanisms which would allow deposit from multiple locations, migration of content between repositories, and more relevant to this discussion, deposit to multiple repositories, which would allow a single deposit process to deposit into multiple repositories, for example institutional and disciplinary repositories, or as are becoming more prevalent, funder repositories (Allinson et al., 2008). Another project is investigating a number of related issues including offering outputs from their repository to feed local systems such as departmental and individual web pages (White Rose Research

Online, 2007). The HAL archive in France which hosts a number of institutional repositories has had a similar system for several years with arXiv (researchers can tick a box and the paper is submitted to arXiv as well). Connections also exist with PubMed Central and ADS (Foulonneau, 2008). If the IR projects studied were able to align their IR technologies with disciplinary repositories in these ways, they would have a new set of researchers enrolled in short time.

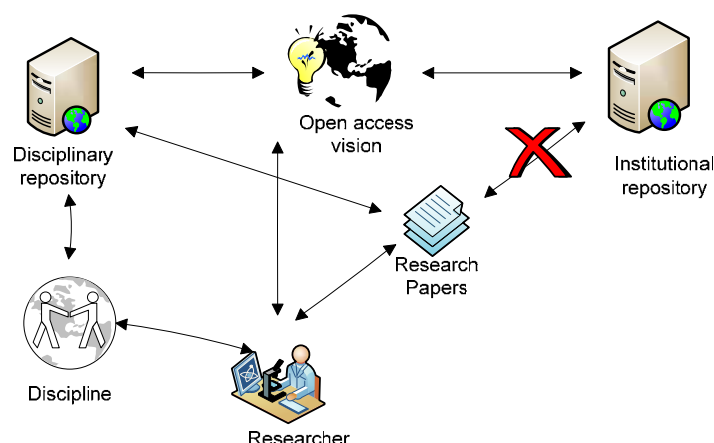


FIGURE 7-4: RESEARCHERS OA VISION MEDIATED BY RELATIONS WITH DISCIPLINE

However, other researchers adopt the IR for OA for a multiplicity of reasons; they find it personally rewarding, they are transformed by the public good aspect of the vision, or they perceive anti-OA behaviour to be risky. These researchers counter anti-programs by making the programmatic behaviour personally rewarding (Helgesson & Kjellberg, 2005). They may act on the visionary aspect of OA as a public good that will, to reiterate part of the BOAI:

“accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, make this literature as useful as it can be, and lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge” (Budapest Open Access Initiative, 2002).

An example of this is the Researcher – Social Science of Medicine at Janus University who states “...in publicly funded research areas there is a requirement that publicly funded research is publicly accessible ...that’s of course a very important issue for us”. The openly accessible nature of the IR provides a good match between the OA Vision and their own vision of the role and nature of research and scholarly publishing as depicted in Figure 7-5.

Others accept that anti-OA behaviour may be costly (by risking fewer readers, fewer citations, for example) and thus despite the anti-programs persist with their OA vision and use the IR.

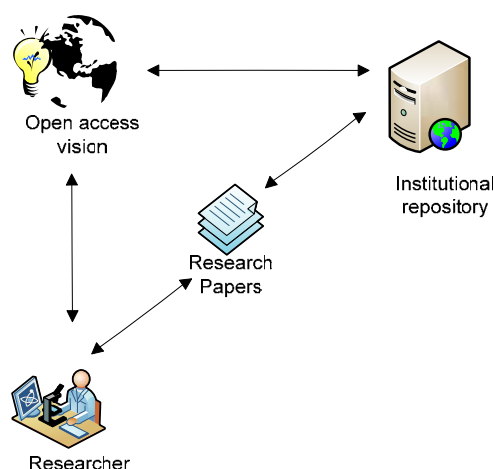


FIGURE 7-5: RESEARCHERS OA VISION TRANSLATING RESEARCHER TO IR FOR OPEN ACCESSIBILITY

Following in Figure 7-6 we have a visual representation of examples of the relations of the implementers and researchers with the institutional repository at Janus University. There is one IR (at this point in the story anyway) but we see there are many OA Visions. This is because the reality of the OA vision is simultaneously enacted in many different ways (Law, 2004) like the body multiple in Mol's work (2002). The OA vision, that it is more than one, and less than many, enacted in the overlapping and coexisting worlds of the researchers and implementers who enact it (Mol & Law, 2002).

This part of the story illustrates how one OA vision goes out into the world and because it interacts with a wide range of actors who inhabit "different realities [which] overlap and interfere with one-another" (Law 2004: p. 61) and is enacted in a wide range of locations for a wide variety of functions, we may say it fractionalizes. Each enactment of OA in this case looks slightly different. Despite the fact that it is fractional it is a coordinating mechanism (Mol, 2002). It is not always "pure" OA, sometimes it looks different because of publisher policies or disciplinary requirements or researcher perceptions, but it is still OA. It may be said to be multiple and fluid (Mol & Law, 1994; Mol, 2002; Moser & Law, 2006).

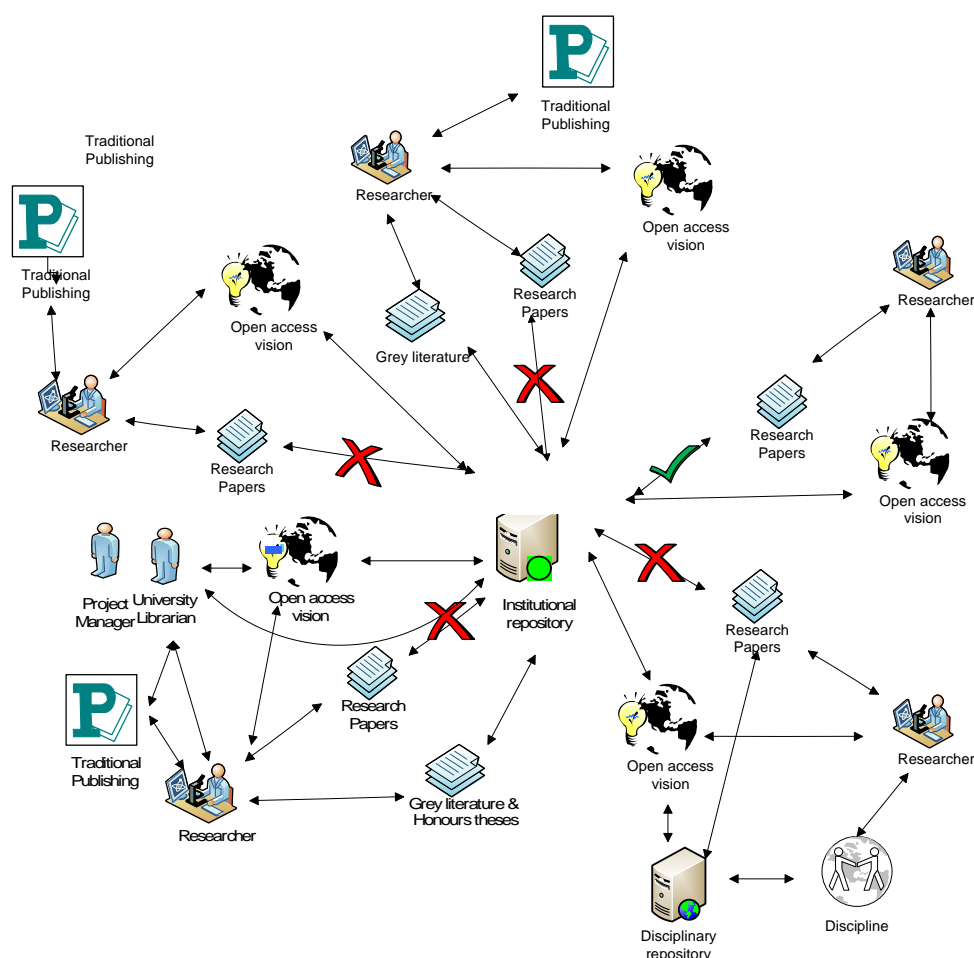


FIGURE 7-6: JANUS UNIVERSITY RESEARCHERS AND IMPLEMENTERS ENACT THEIR OWN INCARNATION OF THE OA VISION WHEN INTERACTING WITH THE IR

However, actors, even visionary, fluid ones, cannot necessarily work on their own. They need researchers, repositories, papers, implementers to work with them. In the text and images above we see how actors from the traditional publishing network or disciplinary networks can mobilise anti-programs against such powerful visionary actors as OA. The work of the anti-programs maintains some of the allies of the networks enacting them, and the OA vision shifts some alliances to itself. In the next two sections we will look at how the OA vision enrolls and mobilises a Mandate and thus through unseen negotiations and associations enrolls an Institution as a macro actor, and following that how IRs work with OA to reassemble scholarly publishing.

7.3 OF INSTITUTIONS AND MANDATES

While actors within the institutions are instrumental in setting up the IRs, and the institution is implicit in the name “institutional repository”, rarely in the interviews, documents or in the IR itself is the institution itself spoken of or called into account as an actor, except when academic reward systems are mentioned. I will not dwell on this aspect; just accept that it is a part of the picture, can act as an anti-program for OA and the IR and is discussed in Chapter 6. Instead I wish to look at the role the institution plays in introduction of an institutional repository and therefore in introducing OA and contributing to the reassembling of scholarly publishing.

Let us first look at Janus University. Elements of the institution, micro actors such as the Project Manager, the University Librarian, researchers, are represented and active as illustrated in Chapter 6, but there are no traces of the institution acting. No actor at Janus University speaks behalf of its micro actors with regard to the IR or OA (Callon & Latour, 1981; Helgesson & Kjellberg, 2005). This indicates that at Janus University OA and the IR are not central to the concerns of the institution, and this lack of centrality is reflected in the complex array of programs and anti-programs being enacted at Janus University regarding the IR, often by the same actors. The OA nature of the IR is ambiguous and its trajectory uncertain. There is more dispersion than alignment coupled with fragmented and shifting alliances. However the story is far from ended here, durability may yet result as we will see. The OA vision, is still acting as is the IR, and their allies. As yet, however, the Institution as a macro actor is not playing a role.

Conversely at Jupiter University, where the institution is also rarely mentioned as such, frequently mentioned is its delegate the Mandate. Through an institutional policy, the Mandate, the institution as a macro actor speaks and aligns the IR and other actors. The OA vision itself had a role in this translation by finding allies which firmly acted to counter anti-programs. Initially the DVC was translated by OA, he in turn translated the university’s own vision and conscripted it to work with the OA vision to enrol senior decision makers and together they produced a policy, the Mandate. The Mandate *requires* research outputs to be placed in the repository and clearly defined whose responsibility it would be – authors and researchers.

It could be argued that the mere presence of the Mandate policy had lead to the greater uptake of the Jupiter University IR ePrints. However, although it plays a role, researchers are not renowned for their following of policies:

... there is a policy in this place and I like the idea frankly. Not that you can actually get academics to do anything just because you have a policy [Senior Lecturer Information Management – Jupiter University].

And even when they do, sometimes it takes a lot of encouragement and persuasion:

I think I must have heard [Repository Manager] speak maybe two, three or four years ago the first time, and I only just at the beginning of this year put my stuff on the ePrints repository. So it was just sort of not... – thinking it sounded good in theory but just never really making the time to do it. (Senior Lecturer Law a – Jupiter University)].

Instead what we are seeing is a group of human and non-human actors (OA activists, the DVC, the University vision, university decision makers) mobilised by the OA vision creating a new actor, the Mandate. The Mandate emerged from the relations of the actors working around it. The Mandate is a policy of the Institution. It has translated the ideals of the OA vision, the University's vision and its enrolled actors at Jupiter University into a single vision. It does have agency in that it does speak and act on behalf of the institution, a macro actor.

In the Jupiter University case the Institution may be seen as a black box (Callon & Latour, 1981) – it contains the relations of many actors and in this story it is only enacted through its relationship to its delegates the DVC, the Mandate and ePrints the repository. The Mandate works in concert with the human actors, the visionary actor OA and the IR itself and with them exerts power it inherits as a delegate of the macro actor, the university. This mobilisation of allies and exercise of delegated power is a strong counter to the anti-programs of the powerful actors of the traditional publishing network. The institution in this case, unlike those reported elsewhere (Hernes, 2005), is not an indisputable source of authority or knowledge, it is rather a loose alliance of related actors itself but that story is for another thesis.

The Repository Manager works hand in hand with the Mandate, a communication plan, liaison librarians and other allies to enrol researchers into the IR while the anti-programs, the Disciplinary and traditional publishing networks for example, struggle to maintain their durability against their alliance. Establishing and maintaining the IR actor-network is work conducted by these many heterogeneous actors in concert. How these heterogeneous actors counter the disciplinary network anti-program is illustrated in Figure 7-7 and the publisher network anti-program in Figure 7-8.

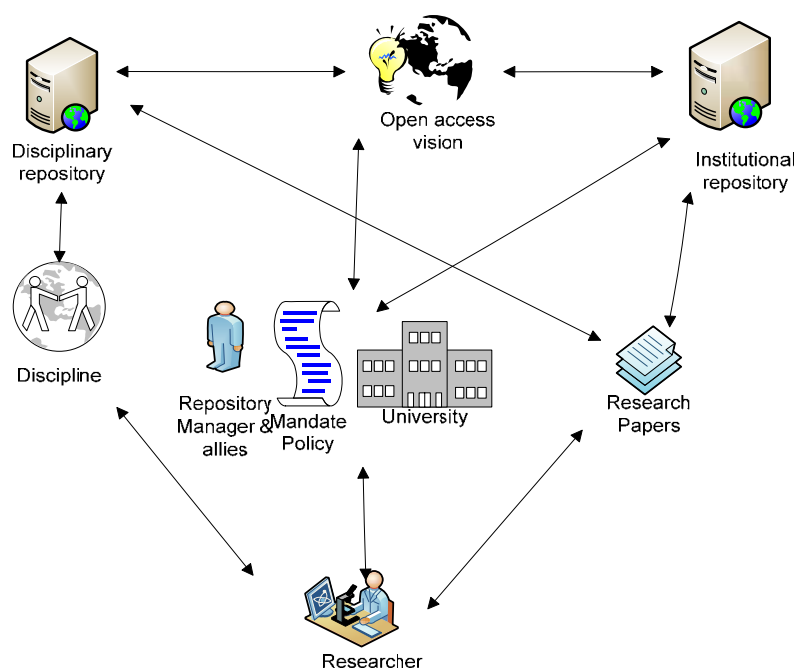


FIGURE 7-7: JUPITER UNIVERSITY COUNTER DISCIPLINARY NETWORK WITH COUNTER PROGRAMS AND MANDATE

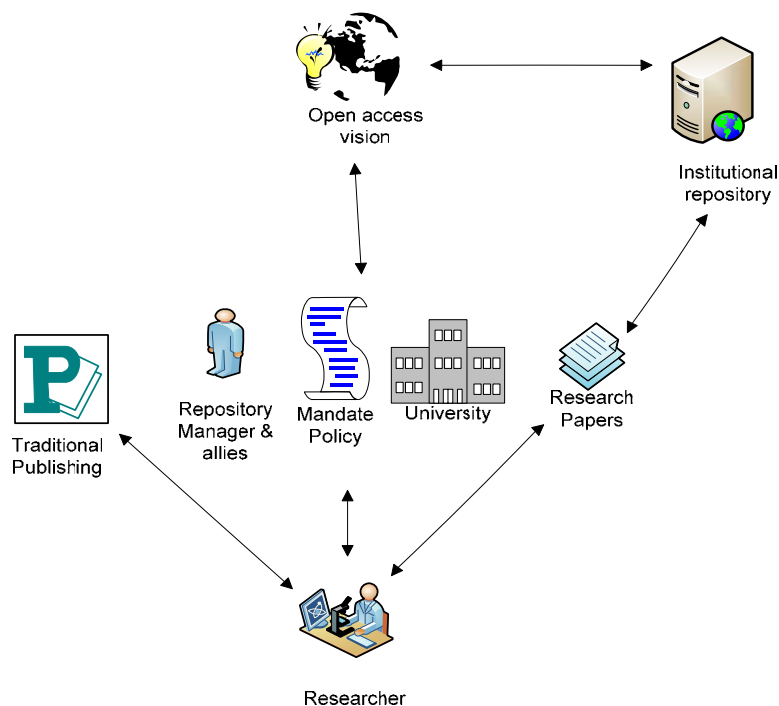


FIGURE 7-8: JUPITER UNIVERSITY COUNTER TRADITIONAL PUBLISHING NETWORK WITH COUNTER PROGRAMS AND MANDATE

Because of their constant work, the ongoing project of the ePrints IR, the Mandate and their allies, the researchers interviewed at Jupiter University use either their disciplinary

repositories or web pages as their discipline prefers AND ePrints. For example the following researcher uses both ePrints and SSRN or their web pages:

Furthermore I put all my papers on my website ... ePrints as well. Until somebody stops me I make all my stuff freely available and have done [This researcher previously also mentioned putting his work in SSRN and RePEC] ... [Professor Economics – Jupiter University].

We can see the Mandate as a script aiming to bind actors to a program of action, delegating roles and a trajectory to them (Latour, 1996) but it does not work alone. It works in concert with a range of human, technological, material and visionary actors, and work it must. Researchers' memberships of many networks still competing for their attention mean that the OA vision and its allies must make translation their ongoing project.

In addition to acting to encourage researchers to deposit their work the Mandate acts to bring together the many OA visions of researchers and implementers in the institution and establishes a Jupiter University vision of OA. While the Mandate does not refer explicitly to OA – rather it refers obliquely to the vision to which OA aspires:

*Material which represents the total publicly available research and scholarly output of the University is to be located in the University's digital or "Eprint" repository.... **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** [my emphasis].*

Thus if we reproduce Figure 7-6 (see Figure 7-9 below) for the Jupiter University setting we find that while we may have one repository and many researchers beginning with many views of OA at Janus University, at Jupiter University the Mandate works to align the researchers many disparate visions of OA. The struggle to establish OA at Jupiter University does not end with the creation of the Mandate, and the work of the Mandate is a work in progress but the Mandate is a strong actor in the continuing work of translation. The Mandate works to increase the coherence of the fragmented OA visions into one consolidated OA vision for the members of Jupiter University and thus presents a much less complex and more coherent picture.

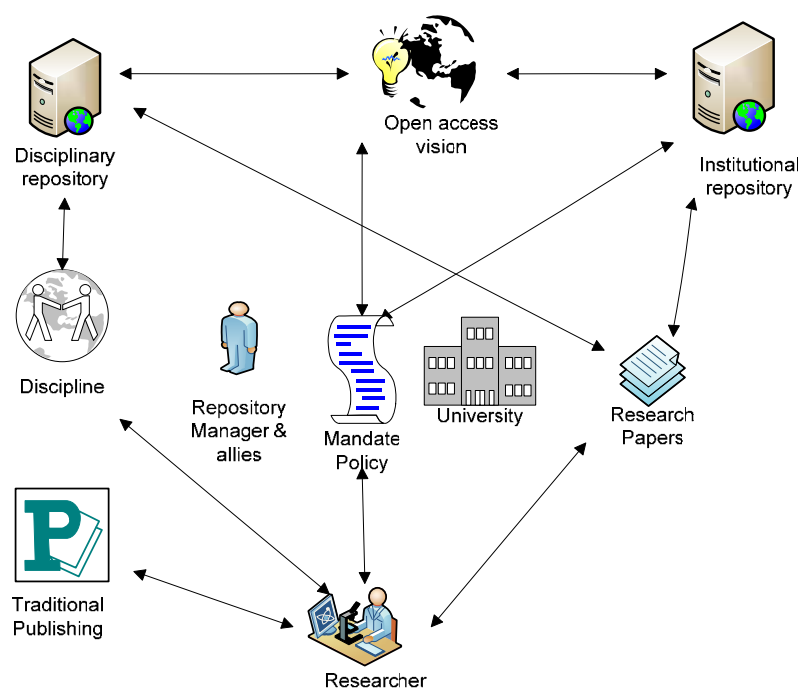


FIGURE 7-9: JUPITER UNIVERSITY RESEARCHERS AND IMPLEMENTERS ENACT A VISION OF OA UNIFIED THROUGH THE MANDATE AND INSTITUTIONAL ALLIES

The Mandate is not just an actor within the institution. It also acts in a growing network of Mandates around the world. In Australia Mandates and other policy actors for OA in IR are growing and predicted to grow further (Australian Government Department of Innovation, 2008; Carr, 2008) as they do worldwide (eprints.org, 2008). As mentioned in Chapter 6 the Australian Research Council “strongly encourages” deposit in IRs and this encouragement works with the Jupiter University IR and Mandate for some researchers:

I can see problems here because the ARC also now wants us to give access to papers published from grants funded by them so I guess that I will have to change my attitude! [Professor Mathematics – Jupiter University].

Jupiter University was the first institution in the world to institute an OA IR institution wide Mandate in 2003, active as of 2004. Indeed it is the first mention I can find of a Mandate of any kind (Suber, 2007). Now in 2008 22 OA IR institutional Mandates exist. Where other institutions do not follow suit researchers take the issue into their own hands. This is illustrated where as Faculties at powerful institutions such as Harvard and Stanford have enacted their own Faculty Mandates rather than waiting for their institutions to act. Mandates are building their own network in support of the OA vision worldwide. Whenever the OA vision is enacted in a mandate its network is extended and OA scholarly communication is further extended and strengthened.

The Mandate is a kind of a rhetorical actor who speaks on behalf of the University. Through its relations with the OA Vision, the University Vision and the IR technology the Mandate translates them into words eloquently expressed and calculated to persuade, that is rhetoric. The Mandate becomes an actor by drawing the attention of other actors, especially researchers, and by appealing to their consciousness and their responsibilities. It encourages, persuades, and entices, researchers to place their research outputs into the OA institutional repository. Further it works on other people and universities and funders, with its allies the OA vision and OA activists, and increasingly with its other Mandate allies, to encourage them to enact their own Mandates. This is an example of rhetoric being performative as discussed by Moser and Law (p. 60).

The agency of the Mandate is interesting not only because it is a macro actor, acting on behalf of an institution, but also because its agency results from its close association with the OA vision and the IR technology. The Mandate, the OA vision and the IR technology form a close-knit network, seen as one strong and decisive actor.

7.4 THE INSTITUTIONAL REPOSITORY

By virtue of being an incarnation of the OA vision and a means of translating its mission into reality, an IR acquires its identity as an actor. An IR identity is built first through its relations with developers and policy makers who enact their own version of the OA vision and interests and inscribe them into IR software. In its beginning as software, sitting on a server, the IR has no agency. The IR becomes an actor as it is used by researchers to upload their papers, to communicate with readers, to monitor downloads and citations as it enables, mediates, interacts, and performs with other actors. Through their relations the IR and researchers enact and materialise the OA vision.

I argue that an IR is a technological (material) incarnation of the OA vision, enacted on one hand through its relations with developers and policy makers, and on the other through its relations with researchers and with other technologies. The agency of the repository technology can be seen in its relations with researchers as it attracts and encourages some to continue to use it and thus contribute to the reassembling of scholarly publishing. By making their research papers publicly available through the use of IR researchers are extending the OA network and contributing to its durability.

Looking at our two cases we can see that in each case, according to the other actors with which it finds itself relating, the IR acts quite differently. Turning our attention first to the IR at

Janus University, JanusWorks, we find that the IR is built on a combination of both open source and proprietary software. While on the web pages of the underlying repository platform, the relationship with the provision of OA to resources is a key component of the make up of the platform, on the web pages of the commercial developer, OA is not mentioned. Instead it specifies that it has the facility to provide access *to all authorised end users*. Additionally while the government department was translated by the OA vision, the university librarian, who was the initiator and overseer of the IR, had a different vision of OA, which encompassed only grey material and theses. Thus initially inscribed in the technology were affordances for this different vision of OA. The IR initially resisted deposit of published papers. Entry screens did not have fields to enable easy entry of pre-prints and post-prints of published material, researchers could not deposit directly, repository staff had to mediate. Even after materials were deposited by researchers, human intervention was required to move the paper correctly into JanusWorks. In addition the IR provided no feedback (for example download statistics, links to author pages, visibility in Google Scholar) to researchers, except an email to say the work had been deposited. And because it did not provide feedback to researchers they stopped using it. The “ordering effects” of translation processes on the IR technology were incoherent thus producing conflicting demands on the IR technology and on the researchers using or intending to use it. As a result the ‘inscription’ processes “through which actors embed their social agendas into technical artefacts” (Holmstrom and Robey 2005, 169) were ambiguous and drove the IR technology development in conflicting directions.

However, after the appointment of a business analyst and software developer in 2007, JanusWorks formed a partnership with the business analyst (BA). Researchers were able to interact with the repository in the presence of the BA. The repository was able to tell them what it could do, and the researchers were able to provide feedback about what they would like it to do. A dialog was thus established and researchers began to make clear their preference for a wider vision of OA. Affordance for the deposit of many more types of material were accorded the repository. In addition researchers requirement for findability were heard and the repository was opened in late 2007 to Google, Google Scholar and other search engines.

We see here a repository initially inscribed with a limited version of the OA vision as a result of its relations with its implementers, developers and policy makers. However, with time we see a broadening of its relations to include interactions with a business analyst and personal software developer who acted as mediators between the repository and researchers. Their

mediation enabled affordance in JanusWorks to be built for a broader vision of OA, and also for the repository to be able to provide feedback to researchers in terms of download counts to provide an indication of usage and interaction with Google and more specifically Google Scholar. These facilities aligned the repository more closely with the OA vision. In turn this alignment with the OA vision worked to align researchers who valued these properties.

Our second case, Jupiter University ePrints provides a more illustrative example of an IR that was an actor from its early days, an actor that specifically inscribed, as we have seen above, an institutional, or at least a less-fragmented view of the OA vision. The script for the OA vision was delegated into the repository. The repository is an actor “shifting competencies and affordances back and forth” between itself and other actors (Latour, 1996). Its specific affordance was to provide OA to the *“material which represents the total publicly available research and scholarly output of the University”*. From this we may imagine the major beneficiaries would be those who wanted to read the material deposited therein. However, the researchers depositing found that the repository afforded other unintended benefits to them. It was also able to provide feedback not just to implementers, but to researchers by being active and “alive” from its early days rather than having to wait until it was “shiny”. Although ePrints was viewed as a work in progress, researchers could find their papers in ePrints, and because their papers were in ePrints they could find their papers in the related technological actors, Google, Google Scholar and other search engines. ePrints worked in concert with these actors to translate researchers to its vision of OA afforded by its developers and the Mandate.

Out of curiosity many monitored the number of times their papers were downloaded. Downloads provided an indication that someone, somewhere was reading their work. Several also believed that the openly accessible nature of their work increased their citations; at least they noticed an unconfirmed correlation with the placing of their work in the repository and an increase in their citations. Some monitored their own, and their colleague’s, downloads for more qualitative purposes – what areas within fields were generating interest. Further, several authors publishing in fields which had a traditionally Australian dimension to their publishing and who mainly published in Australian journals (fields such as Law and Education), found that ePrints afforded an extension of their professional networks internationally. Some OA activists might say “but these are all the things we believed and intended OA to afford”, however repositories such as JanusWorks in its lengthy development stage, and small numbers of researchers using it could not afford these benefits.

We see that as the repository developed it worked with researchers to retain them, sometimes by adjusting its own requirements (accepting formats other than pdf, simplifying the copyright procedures) requirements, sometimes by offering benefits. Sometimes the benefits were planned, for example those specifically related to OA, and sometimes unplanned. Sometimes the benefits were quite unexpected and unintended by the repository itself or its implementers. Three researchers expressed their belief that by making their work openly accessible they were able to publicly claim territory for work in the pipeline at a journal or not yet formally published. Many also said that placing work in ePrints compensated somewhat for the lack of timeliness of many of the journals they published articles in and books they published Chapters in. But some benefits that enrolled researchers to the IR were not at all related to OA. Examples here include that ePrints assists them in organizing their work by providing them with reliable storage and retrieval and removes the need for keeping filing cabinets full of papers. Further that ePrints provides them with backups and a *nice ordered record* of their papers; ePrints is thus perceived as durable. These findings confirm Borgman's (2007) suggestion that people will adapt technologies to suit their practices in ways neither the designers, nor potential users earlier predicted.

These benefits, intended and unintended afforded by ePrints itself, bind researchers to the repository and to the OA vision. And those perceiving the benefits of making their papers available are not only bound themselves but also bind others (such as their students and colleagues). By making their research papers publicly available through the use of ePrints researchers at Jupiter University are extending the OA network and contributing to its durability.

When researchers reject an IR and any other form of OA they remain *de facto* instruments of the anti-programs of powerful actors such as traditional scholarly publishing or other networks to which they belong. In these cases the OA vision and its realisation in the IR are not strong enough to enrol researchers into their actor network. For instance, JanusWorks with its ambivalent identity from the beginning (initially only allowing grey literature, providing feedback to implementers not researchers), was a weak actor. As a result JanusWorks has so far made a small contribution to the extension of the OA scholarly network.

7.5 VISIONS, MANDATES AND TECHNOLOGIES

How and why is OA reassembling scholarly publishing?

Let us look first at Why? We see that OA comes to scholarship as a vision. It is a vision due to its almost “sacred quality that makes it difficult for a rational person to be against” it (Briers & Chua, 2001) (p 242), It is hard to argue that research, often funded out of the public purse, should not be a public good, should not be equally accessible to rich and poor, now that it is possible to do so, afforded by the development of the Internet, search engines, and other associated information and communication technologies.

So we now have technological opportunities. If we invented academic publishing today it would look completely different from this vast numbers of specialised journals that are a print product [with restricted electronic access] [Professor Business – Jupiter University].

For me this is the simplest question to answer in the thesis. OA is a vision that makes sense, is hard to argue against, it is congruent with the aims of science and scholarship.

And turning now to “How” does OA contribute to the reassembly of scholarly publishing? Not only does OA have this “sacred quality” endowing it with the persona of a vision, it has other qualities. It also has flexibility, mutability, fluidity. These qualities enable each human actor to adopt and enact their own version of OA that fits with the relations that exist within their existing networks. Simple examples include: that a researcher with a disciplinary culture may enact the vision through a disciplinary repository, a researcher in an institution with no repository may place their papers directly on the web, may utilise OA journals, may publish in traditional journals and make their work openly accessible after embargo periods, may chose to make only some of their work OA and so on. Not only this, its visionary qualities enable it to enrol additional actors, such as the DVC at Jupiter University and the Mandate, to work on its behalf.

Given its visionary characteristics and its flexibility why is OA not practiced by all researchers all the time? In Chapter 6 we looked at many of the anti-programs operating against OA. Researchers have for a long time been enrolled in the traditional scholarly publishing network and learned to adopt and enact a particular set of values. Being threatened by the OA vision and its OA scholarly communication network the powerful actors of traditional scholarly publishing have launched anti-programs suggesting to researchers that their identities and their values are also threatened. When their relations connections, entanglements with the anti-programs are stronger than those of OA and IR the *status quo* is preserved. In these cases the OA vision and its realisation in IR are not strong enough actors to enrol researchers into their actor network. For instance, JanusWorks was an ambivalent identity from the beginning (for its first three years only providing feedback to implementers), and this appeared to

actively or passively discourage researchers from adopting it. The ambivalent nature is a result of relations with implementers who themselves have ambivalence towards the OA vision. As a result JanusWorks has so far made a small contribution up to this point to the extension of the OA scholarly network. But ePrints alternatively has made a major contribution working with OA and researchers to strengthen the network, not just within Jupiter University but beyond in the OA Mandate network.

“How” OA contributes to scholarly publishing then, is by providing a vision that is congruent with the aims of researchers, scholars and scientists, and by being flexible enough for them to be able to enact that vision in a number of ways. OA is patient. It knows it will not translate all researchers straight away, but as it translates one, it can often rely on them to translate others. In addition it actively recruits other actors to its cause. Actors generally cannot work alone, especially when they are working towards change and reassembly in their relations to a network as large and complex and seemingly durable as scholarly publishing. OA knows it can only achieve its desired form and attributes as a consequence of its relations with other actors (Law, 1999). These other actors contribute towards the answering of that “how”? And they contribute towards answering my second research question.

What role does introducing an OA institutional repository to researchers play in this reassembly?

OA activists developed the initial and underlying software platforms to promote OA. While the designers inscribed their OA interests into the technical artefact of the IR, in a way defining the role and use of the IR (Walsham, 1997), some affordance in the IR also enabled researchers interests to become inscribed as they used it (Moser & Law, 2006). Congruent with the aims of OA, these were often open source or free. The artefact of the IR is developed to work with a multitude of other actors. It is not too rigorously bounded and it acts to further OA, in one version of OA’s vision. As the software is introduced in institutions it goes to work with and for researchers, accepting papers, disseminating them through its relations with the Internet and search engines, providing feedback to implementers and researchers.

We saw that particularly ePrints at Jupiter University, but also increasingly JanusWorks, enact relations with researchers that change over time and are constantly negotiated, responding to researcher needs and changes in related technologies. As researchers add their papers to the repository, their own boundaries change as they have the potential to interact with a different and wider community than they have in their traditional publishing and in response to the work of the IR to reassemble their publishing practices to include depositing in the IR. In

enacting their relations with the repository they are encouraged to consider their publishing practices and to consider OA. Further, as the repository affords other benefits than open access, many researchers appreciate these, and almost as a by-product of these relations come to appreciate OA.

Other allies are called to work. Jupiter University enacted the Mandate Policy. The Mandate translated the vision and ideals of the OA vision, the University's vision and its enrolled actors at Jupiter University into a single vision. But despite being of the institution it has agency beyond the institution. Other OA activists saw how the Mandate worked within Jupiter University, encouraging deposits in the repository and so the idea of the Mandate flowed beyond the institution to meet with other actors in other networks. While Jupiter University, ePrints and OA inscribed their interests into the Mandate, it did not become immutable, instead it became more a mutable mobile (Moser & Law, 2006) like the IR. It developed a more fluid nature by moving to other networks, networks of Mandates and networks encouraging and building mandates where it became part of the mixture of the scholarly publishing world, reassembling, reconfiguring, reimagining.

7.6 CHAPTER CONCLUSIONS

So we see OA, a vision working at establishing itself as an adjunct to existing publishing, or even potentially heralding a new way of publishing. It recruits and aligns allies who deliver communications and develop technologies to support it. But its work is slow. It wants to speed it up. It creates new allies – Mandates - first with one funder, and then with one institution and then slowly through the worlds of the funders and supporters of research. These actors develop policies that Mandate that those working within the institution or funded by the organisation place their work in an openly accessible digital repository. It creates allies in the artefact of the IR and in the IR's relations with researchers, the Internet, search engines, readers. In the mix of scholarly publishing OA has emerged, gathered allies such as IR and Mandates and contributed along with many other actors to a reassembly of scholarly publishing. There is no one actor, no one thing that contributes to that reassembly, rather a set of relations between actors, mixtures and gradients (Mol & Law, 1994). Despite the growth of OA and IR, traditional scholarly publishing has not disappeared. The emergence of new actors does not necessarily mean the disappearance of existing actors, although it may do so. The jostling, aligning and realigning is still taking place at the time we are studying scholarly publishing and OA networks in action (Latour, 1987). The two stories of OA and IR presented

in this thesis provide a novel insight into the assembling and reassembling of scholarly publishing.

At the beginning of their paper on the Zimbabwe Bush Pump de Laet and Mol (2000) say their paper is not critical, nor is it neutral for they “...*like, no even better, happen to **love** the Zimbabwe Bush Pump in all its many variants*”. I must state here that I like, perhaps even love the OA vision. At the beginning of this work I was intrigued by OA, I wanted to understand it more, I wanted my colleagues to discuss it and understand it more. But as I came to know it better I did indeed come to love it. I love it for itself, for its vision, and like de Laet and Mol and their bush pump, I love it for its fluidity, strength, action, relations and congruence with the aims of scholarship and research. I am even learning to like its more prosaic, but nonetheless essential ally, the repository which works to enact and further the vision of OA.

CHAPTER 8

8 CONCLUSIONS

This thesis is a story of scholarly publishing undergoing change. The change is inspired by new technological possibilities and the vision these technological advances afford – OA. In the words of the Budapest OA Initiative OA has arisen because “An old tradition and a new technology have converged to make possible an unprecedented public good” (Budapest Open Access Initiative, 2002). Many technological actors have played very important roles in the changes occurring in scholarly publishing and of these I have focussed mainly on the IR. But the IR could not do its work without its colleagues, the Internet and the World Wide Web, search engines such as Google and Google Scholar, OAI-PMH and others. In the words of a Professor of Business at Jupiter University:

There has been a technology shift that shows in some respects what we are doing with thousands and thousands of journals that begin here and end there and the whole system that is set up for this brick and mortar world. We wouldn't come up with anything like that if we invented academic publishing today.

In this Chapter I summarise the major findings of the research undertaken for this thesis and outlines its major contributions to theory, method and practice. Finally I draw attention to issues which remain un-researched and present a multitude of opportunities for further research.

8.1 SUMMARY

How and why is OA reassembling scholarly publishing?

OA comes to scholarship as a vision. It is a powerful vision due to its almost “sacred quality that makes it difficult for a rational person to be against” it (Briers & Chua, 2001)(p 242). It is hard to argue that the findings of research synthesised into publications, often funded out of the public purse, should not be a public good, should not be equally accessible to rich and poor, now that it is possible to do so, afforded by the development of the Internet, web technologies, search engines, and other associated information and communication technologies. OA is a vision that makes sense, is hard to argue against, it is congruent with the aims of science and scholarship. Merged with the Internet and Web technologies the OA vision emerged as a powerful actor which makes obvious the limitations of traditional scholarly publishing and illustrates how the world of scholarly publishing can be different. This is why it

contributes towards opening up the black box of traditional scholarly publishing, and contributes to its reassembly,

Not only does OA have this “sacred quality” endowing it with the persona of a vision, it has other qualities. As I have shown in this thesis it also has flexibility, mutability, fluidity. These qualities enable each human and organisational actor to adopt and enact their own version of OA that fits with the relations that exist within their own networks. Not only this, its visionary qualities enable it to participate in enrolling additional actors, such as the Mandate at Jupiter University to work on its behalf.

Given its benefits to scholarly communication, its visionary characteristics and its flexibility why is OA not practiced by all researchers all the time? In studying two cases, one with a strong and vibrant OA IR and the other with a slowly emerging ambivalent IR that is ambivalent about OA we are able to see that despite its visionary nature OA requires allies to overcome the powerful anti-programs emanating from the traditional publishing network in order to establish its own claims. In Chapter 6 we looked at many of the anti-programs operating against OA. When researchers reject an IR and any other form of OA they are *de facto* enacting the anti-programs launched by powerful actors in the traditional scholarly publishing networks. Their relations, connections, entanglements with the anti-programs are stronger. In these cases the OA vision and its realisation in IR appear to be weak actors, unable to enrol researchers into their actor network. This ambivalent nature is a result of relations with implementers who themselves have ambivalence towards the OA vision and who have inscribed this ambivalence into their own IR technology. Alternatively in an institution where OA finds allies with a strong commitment to its ideals together they develop programs to counter the anti-programs, enlist the aid of a macro actor, a Mandate speaking on behalf of the institution, and thereby work together to strengthen the OA actor-network.

But importantly the black box of traditional scholarly publishing has been opened and scholarly publishing continues to be reassembled. OA is patient. It knows it will not translate all researchers straight away, but as it translates one, it can often rely on them to translate others. In addition it actively recruits other actors to its cause. Actors generally cannot work alone, especially when they are working towards change and reassembly of a network as large and complex and seemingly durable as traditional scholarly publishing. OA knows it can only achieve its desired form and attributes through its relations with other actors (Law, 1999). The emerging relations and increasing alignment between the OA vision and the Internet and Web technologies, in particular institutional repositories studied here, have already created an

extraordinary momentum in the reassembling of scholarly publishing, not seen since the Gutenberg printing revolution. The growing alliances between the OA vision, IR, researchers, university policy makers and policies, such as the DVC, Repository Manager and the Mandate at Jupiter University, extend and strengthen the OA actor networks and their capacity to counteract anti-programs by the traditional publishing network, thus providing a tentative answer that the question of “how”? And they contribute towards answering my second research question.

What role does introducing an OA institutional repository to researchers play in this reassembly?

OA activists developed the initial and underlying software platforms to promote OA. While the designers inscribed their OA interests into the technical artefact of the IR, in a way defining the role and use of the IR (Walsham, 1997), some affordance in the IR also enabled researchers interests to become inscribed as they used it (Moser & Law, 2006). Congruent with the aims of OA, these were often open source or free. The artefact of the IR is developed to work with a multitude of other actors. As the IR technology is introduced in institutions it goes to work with and for researchers, accepting papers, disseminating them through its relations with the Internet and search engines, providing feedback to implementers and researchers. The more the IR technology inscribes researchers’ needs and interests, the more productive its relations with researchers and the more effective the enactment of the OA vision. Furthermore, the higher the flexibility and malleability of the IR technology with respect to researchers’ emerging OA vision and needs, the stronger and more durable the relations between the researchers, the OA vision and the IR technology.

We saw that particularly ePrints at Jupiter University, but also increasingly JanusWorks, enact relations with researchers that change over time and are constantly under review, responding to researcher needs and changes in related technologies. As researchers add their papers to the repository, their own boundaries change as they have the potential to interact with a different and potentially wider community than they have in their traditional publishing and in response to the work of the IR to reassemble their publishing practices to include depositing in the IR. In enacting their relations with the repository they are encouraged to reflect on their publishing practices and to consider OA. Further, as the repository affords other benefits than OA, many researchers appreciate these, and almost as a by-product of these relations come to appreciate OA.

The IR is better able to work with OA to play a role in the reassembly of scholarly publishing when the actors engaging with it have a less ambivalent, more unified vision of OA, and we have seen Jupiter University how this is achieved with a Mandate and with a repository that is responsive and interacting with researchers. While Jupiter University, ePrints and OA inscribed their interests into the Mandate, it did not become immutable, instead it became more a mutable mobile (Moser & Law, 2006) like the IR. It developed a more fluid nature by moving to other networks, networks of Mandates and networks encouraging and building mandates where it became part of the mixture of the scholarly publishing world, reassembling, reconfiguring, reimagining.

8.2 CONTRIBUTIONS

8.2.1 CONTRIBUTION TO THEORY

In this thesis I proposed a new and innovative way of seeing and examining the web of relations which comprise scholarly publishing by adopting and applying ANT. By following the actors, social and material, the ANT account enabled me to examine and theorise changes in scholarly publishing as sociomaterial practices brought about by a multiplicity of relations, including those with OA and IR. An outcome is an improved in-depth understanding of how scholarly publishing is being reassembled through emerging OA and IR networks.

Through the comparative empirical study I illustrate that OA is a vision that plays a key role in OA uptake and institutional repository implementation when it is invoked due to its almost “sacred quality that makes it difficult for a rational person to be against” it (Briers & Chua, 2001)(p 242); that each human actor adopts their own version of the OA vision, influenced by their relations within their other related networks; and that researchers and implementers enact their own incarnation of the OA vision when interacting with the IR. My comparative analysis of the two ANT stories, suggests that:

- When humans and technologies within an institution enact a multiplicity of visions of OA that are ambivalent and mutually contradictory, its relations with researchers and implementers are ambiguous and its enactment in an IR is uncertain.
- Alternatively when the humans and technologies enact (inevitably) different but congruent visions of OA and strong relations exist between all the actors, then the OA IR is more likely to be used by researchers. I also illustrate that congruence of a vision of OA can be achieved within an institution by the development and enactment of an

institutional policy, or rhetorical actor, such as a Mandate which serves to reduce ambiguity and therefore strengthen the relations and enactment of the IR.

In examining scholarly publishing, OA and IR as sociomaterial actor-networks I proposed a new way of achieving a deeper understanding, and appreciating the agency, of the OA vision. My ANT account reveals that it is the technological incarnation of the OA vision on the Internet that made a difference in the shaking up, and reassembling of scholarly publishing. Prior to the Internet and powerful Web technologies we did have such an open vision for scholarship but had a very limited agency: researchers freely exchanged hard copy versions of their papers, in hard copy, often by post! But this was so miniscule that it did not feature strongly on the radar of scholarly communications in all disciplines. We have to remind ourselves that the OA vision of that time was different as well, reflecting the limited technologies available then to make papers freely available. So when the Internet provided the opportunities for almost unlimited communication and when Web technologies enabled powerful repositories to be linked and searched, not only is the OA vision technologically (or one may prefer 'materially') realised, the vision itself has been transforming. While the OA vision and its multiple technological incarnations have been reassembling the scholarly communication both have been re-produced and re-enacted in this reassembling. As I explained in the detailed ANT account of two life stories of institutional repositories, the agency of the OA vision can be fully grasped when we understand its intense interaction with IR technologies, and their simultaneous interaction with researchers and their papers, university policies and other actors in complex and intermeshed scholarly publishing actor-networks. In other words the agency of the OA vision is materialised through these interactions. The OA vision as an actor has been re-invented and re-produced in these interactions.

The IR is a technological (material) incarnation of the OA vision. It is enacted on the one hand through its relations with developers and policy makers, and on the other through its relations with researchers. The agency of the repository technology can be seen in its relations with researchers as it attracts and encourages some to continue to use it and thus contribute to the reassembling of scholarly publishing. By making their research papers publicly available through the use of IR, researchers are extending the OA network and contributing to its durability. Jupiter University ePrints is an illustrative example of an IR that was active from its early days, giving feedback not just to implementers, but to researchers. Researchers could find their papers in ePrints, and because their papers were in ePrints they could find their papers in Google and Google Scholar. They followed their download statistics and citations

and perceived these were afforded by the repository and its OA properties. In this way the IR contributed both to the reassembly of scholarly publishing and the dissemination of the OA vision and also offered researchers further, additional benefits to their work as readers and writers.

A further contribution to theory is that I found a way to enable technology and other material actors have a voice, to speak “for themselves” particularly in Chapters Five and Six. I found that until I did this the agency of the non-human actors and groups was concealed when described in the third person, somehow coming across as less real and colourful in writing, tho not in life, than the agency of humans who were afforded the textual space to “speak for themselves”. How I did this was to craft an assemblage from my interactions with the non-human actors themselves, from the articulations of human actors about the non-humans, and by watching how the non-human actor interacted with other actors (Hosein, 2003; Porsander, 2005). This crafting is perhaps not so controversial, however my final ingredient may be. I also used my imagination. Some would criticise this approach as anthropomorphic (Whittle & Spicer, 2008) however, like Latour (Latour, 1992) I perceive the non-human actors as made by humans, substituting for the actions of humans and shaping human action by its affordances and therefore deserving to be represented as richly and fully as possible.

8.2.2 CONTRIBUTION TO THE PRACTICE OF ANT IN INFORMATION SYSTEMS AND SCIENCE

In addition I have made a contribution to ANT in the Information Systems and science (IS) domains, which so far has been dominated by an interpretivist, constructivist view of ANT. ANT is its own approach, not just an interpretive lens. I have highlighted the intentions of actor network theorists to abandon the interpretivist/positivist and objectivist/subjectivist dichotomies (Law, 2004; Latour, 2005), and instead advance a sociomaterial ontology where humans, organisations and materials such as technology exist, perform, work, act, through their relations with one another rather than as a result of inherent characteristics or (only) socially constructed realities. This sociomaterial relational ontology is an important addition to approaches for the examination of IS and information technologies as it recognises the intertwining of human and material agency in the construction of reality (Orlikowski & Scott, 2008). It is sociomateriality of practice, including the practice of IS, and the ways they are reconfigured, that matter. The following of a sociomaterial approach to understand complex and controversial issues that are “in action” (Latour, 1987) rather than resolved, black boxed, or made durable provides IS researchers with an approach to engage with and increase understanding of IS in practice.

8.2.3 CONTRIBUTION TO PRACTICE

This thesis contributes a comprehensive and practical understanding of scholarly publishing reassembling due to its relations with OA and institutional repositories through ANT field studies beginning in two Australian universities. It presents the story mainly from numerous actors' viewpoints, including the ambiguous inscription of the IR technology at the core of this reassembling at one of the field sites. While my studies do not (and do not intend to) represent all cases of implementations of IR, nor all researchers and visions of OA I can say that there is a "common shared complexity" (Hanseth et al., 2006) in the heterogeneity of the actors involved and the multiplicity of complex relationships, networks and actors.

While my field study is not empirically generalisable in the traditional sense, it is a rich and deep description and explanation of what has happened in two institutions implementing OA (OA) institutional repositories (IR). From the ANT account of the trajectory of the two IR implementations we can draw lessons learned for researchers, implementers and university administrations. Thus it is instructive beyond the specific research sites as that very richness and depth may sensitise the readers to events and situations elsewhere and thereby enable the sharing of my experiences and the experiences gained at the field study sites for learning for researchers, other repository implementers, and university administrators (Mol & Law, 2002).

8.2.3.1 IMPLICATIONS FOR RESEARCHERS

The major implication of this research for researchers is the increasing relevance of and necessity for researchers to revisit our own attitudes to and behaviour regarding traditional publishing. OA is a vision that is congruent with the ideals of research and scholarship. In the words of two professors from Jupiter University:

... The reason we are in academia is to generate information to disseminate knowledge and to provide that information to as many colleagues and friends and interested people as possible. ...You want to get it out to teachers, to policy makers and practitioners. So OA provides free access to it, [Professor Education - Jupiter University],

... Well I mean the profession of scientists are all for OA. The more people can read it with the least barriers the more impact we think we have so we don't want anybody to be excluded from reading our work [Professor Economics – Jupiter University].

OA is spreading around the scholarly world, enrolling government departments, research funders, researchers, readers and potential citers. If we research and publish our research, it is in our interests to make it available to as many people as possible. This interest is congruent

with the OA vision. Through OA we can connect back to our ideals. OA works for researchers by increasing access to their work. The access works for researchers by enabling them to claim territory and their contribution to knowledge, increasing the potential to increase citations and collaborations, increasing the readership of scholarly work beyond the academy to practitioners, patients, and others. The actors working against OA proclaim peer review and quality will suffer. There is no evidence yet for this in the disciplines that are enacting OA. Indeed green OA, through repositories is specifically designed to work in conjunction with the existing traditional scholarly publishing network. If a university has an IR, then this is a good way for researchers to showcase their research, and for the university to showcase the full breadth of its research.

It is not just OA itself that offers researchers benefits. Researchers at Jupiter University, who are translated into the OA IR actor network, find other reasons to promote the IR, which are not necessarily related to OA. Papers accepted, but waiting in journal queues for publication can be released through the IR, increasing timeliness of sharing results. Other reasons for utilising the IR include backup, “a nice ordered record”, and the convenience of having all ones papers stored in one, easily accessible place, where they will be curated, stored and preserved.

Where there are strong anti-programs for OA such as journal policies and copyright claims and academic reward systems, what we are witnessing is the exercise of power by actors within the traditional publishing network and by the network itself. The persistence of these networks and their exercise of this power should however been seen in a broader perspective of scholarly publishing that is continuously and, now it seems, unavoidably being reconfigured and reassembled. As researchers we find ourselves reminded of the origins and aims of research, scholarly communication and publishing which lead us to find harmony with the aims of the OA vision and IR.

8.2.3.2 IMPLICATIONS FOR REPOSITORY IMPLEMENTERS

What can repository implementers learn from this study? First, that OA is a powerful vision which may be harnessed and used by repository implementers to encourage researchers to place their work into repositories. We find at Jupiter University high level administrators, the DVC, the university librarian, the repository manager are all enrolled by the OA vision, and back this up with knowledge and support programs for researchers. Everybody from the repository software developers beyond the institution, to the implementers and university managers within the institution, are on working in the same direction. This lessens the effects of the anti-programs enacted by the traditional publishing actor network.

OA is an actor that has high levels of legitimacy within the researcher community, and it has the ability to evoke affective responses from a wide variety of people. However, for many researchers its visionary qualities alone are not enough to make them act by placing their research outputs into a repository. This is because it is seeking to enact change in a world in which other competing actor networks exist, for example the traditional scholarly publishing network, and the academic reward actor network, and these continue to enact powerful and competing anti-programs for OA and IR.

Secondly OA is enacted by actors in different ways as a result of their relations within the other networks to which they belong, such as the traditional scholarly publishing network, or academic reward networks, disciplinary networks. OA can be enacted fully or partially (such as only in relation to grey literature). It can be enacted through OA journals or disciplinary repositories. At the present moment OA is not one, but it is many. It is a multiplicity.

For these reasons, to counter anti-programs and its fractional nature, OA needs allies to work with it to translate researchers to self-archiving their work in the IR and also to translate its fractional message into one clean, clear message for researchers about what OA is, what its benefits are, and how depositing papers in the OA IR will benefit both the individual researcher and the institution. In both cases multiple actors such as liaison or outreach librarians, rhetoric, technology, and so on were utilised to spread the IR and its OA capabilities. But one co-worker, one actor, appears to make the difference and this actor is the Mandate. For Janus University the Mandate for thesis deposits and for Jupiter University the Mandate for deposit of all their research outputs is an actor that exerts considerable power. It works as a macro actor translating the will of the university that researchers will deposit their papers at Jupiter University (and their theses at Janus University) into words eloquently expressed and calculated to persuade, to create an expectation of behaviour or enactment. The Mandate becomes an actor by drawing the attention of other actors, especially researchers, and by appealing to their consciousness and their responsibilities. Without a Mandate the OA message is ambiguous, it does not appear as if the university has unconditional support for OA or its own IR.

Thirdly, the IR itself is the instantiation of OA in the institution. It is enacted on the one hand through its relations with developers, implementers and policy makers, and on the other hand through its relations with the researchers whose depositing, or not depositing, of papers will make the IR durable or not. While researchers say that technical difficulties act as a disincentive, even those researchers complaining about the technical affordances of the IR at

Jupiter University, still used it. Part of this may be attributed to their relations with their institution and the power of the Mandate. However other reasons emerge. Although the Jupiter repository was perceived to have technical problems, it, the Repository Manager, and the other actors in its network were perceived as doing something about the technical problems. They responded and provided feedback to researchers. Feedback was provided by the implementers who fix perceived problems and the repository itself which provides evidence of its efficacy in download statistics and the visibility of papers in Google, Google Scholar and other search engines. Alternatively, the Janus repository, although not launched until it was relatively shiny, still has problems enrolling researchers as depositors of much but theses. It does not provide feedback in terms of statistics yet, though it is now visible in search engines and Google Scholar. When many actors enact reasonably congruent OA vision and work towards a more harmonious sociomaterial network, researchers respond and the IR becomes durable. When the message is ambiguous the IR constantly struggles for durability.

8.2.3.3 IMPLICATIONS FOR PUBLISHERS

Those researchers interviewed for this study, even those in the institution with an OA IR Mandate, (except for one or two researchers with deep reservations about the traditional publishing network and the role of traditional publishers) indicate that they not wish to see the demise of traditional publishing, especially peer review and the particular journals and conferences they value. However, most researchers acknowledge the congruence of the OA vision with their mission as researchers. Similarly, they acknowledge the congruency of the idea of an institutional repository collecting, maintaining, showcasing and curating the research output of a university. Indeed many pointed to how this work performed through one central repository could streamline the currently multiple kinds of research reporting they are required or keen to do.

Further, research funders, both private and government, find it in their interests for the research they fund to be openly accessible. Mandates, both institutional and funder are growing apace. It would therefore seem, for the foreseeable future at least, OA, IR and mandates will become an increasingly prevalent part of the scholarly landscape, and that it would behove publishers to work with them in developing new futures, rather than against them.

8.2.4 IMPLICATIONS FOR UNIVERSITY ADMINISTRATORS

This research indicates that many researchers agree in principal with the OA vision, and this could be harnessed to encourage deposit in IR. Deposit in IR offer institutions benefits, such as showcasing the university's research and researchers, and if deposit rates are high enough, providing a unified way for universities to document their research and provide stewardship, preservation, and management of their research outputs over time. It would appear that an IR can provide a golden opportunity for universities to combine research reporting into one place, the IR which can then be mined for multiple purposes.

Further, this research indicates that aligned with the implementation of an IR, and the provision of staff to support researchers use, further allies are required. Researchers are required to do many administrative tasks, including reporting their research in many ways for many purposes. Traditional publishing is a long existing, durable network. Universities are dispersed organisations. Jupiter University's Mandate for deposit enables the institution to speak with one voice, as a macro actor, through the Mandate which becomes a script binding the actors to a program of action, delegating roles and a trajectory to them. Once researchers are enrolled by the Mandate, they may grumble initially, but in time they find OA and other personal information management benefits for the IR. For the university, a functioning and well-used IR can act as a tool to manage its information about its own research and the knowledge contained therein.

8.3 FUTURE RESEARCH

The complexity of the web of relations surrounding scholarly publishing and OA meant that some actors and their relations were not able to be investigated fully by this thesis. For example, publishers (commercial and society), funders, money and economics, the law and copyright, and libraries are all deeply entwined in scholarly publishing. A rich and deep sociomaterial ANT analysis of their relations with OA and IR, examining and describing their actions, visions and expectations would be illuminating.

Similarly deeper investigations of disciplinary repositories and the possible relations they may have with OA and IR warrant further investigation.

This thesis has focussed on researchers as creators of information and depositors in repositories. It would be interesting to conduct a similar study on researchers as users of information, and indeed of other potential users such as practitioners and patients and investigate the role of OA and IR in the information user networks.

Further, IS research could pay more attention to OA and IR, as it is clear that both technology and the management by organisations (universities), both play an important role in the unfolding of this story. Furthermore, IS as discipline as a field should embrace OA. For IS academics research and findings are applicable beyond academia in the practice of information systems work. A study of whether the OA citation advantage applies in IS might well raise the interests of IS researchers in OA.

With regard to ANT and to sociomaterial analyses, further useful investigation could focus on the role of power. This work touches on it as we see the power the anti-programs exert against OA, and the power the Mandate exerts to encourage deposit in the IR and an awareness of OA, but future research focussing on the issue of power and how it is achieved, strengthened or weakened by the relations of actors with each other would be interesting and useful.

Of course the story of OA is still unfolding. New technologies are always developing and finding new uses. Investigations into the actual and potential uses of wikis and blogs and other more open and collaborative technologies in scholarly publishing would be interesting.

8.4 IN CONCLUSION

The ANT inquiry beginning with the implementations of two IR in two different Australian Universities reported in this thesis demonstrates the ANT capacity to help generate rich stories that deepen our understanding of the contradictory actors and processes currently acting and attempting to reassemble scholarly publishing. It illuminates the role of the OA vision and IR technology in the reassembly. The ANT script underlying our research lets us explore and map the scholarly publishing landscape or, more precisely, a contested reconfiguration of the landscape, not limited to the observed Universities or the IR implementations.

So we see OA, a vision working at establishing itself as an adjunct to existing publishing, or even potentially heralding a new way of publishing. It recruits and aligns allies who deliver communications and develop technologies to support it. But its work is slow. It wants to speed it up. It enrolls new allies and then works with them to create further allies, such as Mandates, first with one funder, and then with one institution and then slowly through the worlds of the funders and supporters of research. These actors develop policies that Mandate that those working within the institution or funded by the organisation place their work in an openly accessible digital repository. It creates allies in the artefact of the IR and in the IR's relations with researchers, the Internet, search engines, readers. In the mix of scholarly publishing, OA has emerged, gathered allies such as IR and Mandates and contributed along with many other

actors to a reassembly of scholarly publishing. There is no one actor, no one thing that contributes alone to that reassembly, rather a set of relations between actors, mixtures and gradients (Mol & Law, 1994). Despite the growth of OA and IR, the traditional scholarly publishing network has not disappeared. The emergence of new actors does not necessarily mean the disappearance of existing actors, although it may do so. The jostling, aligning and realigning is still taking place because we are studying scholarly publishing and OA in action (Latour, 1987). The relations, stories, actions, actors will continue working and reworking, assembling and reassembling while ever there are researchers researching, writing, and communicating.

9 APPENDIX 1

This Appendix lists those resources which were often consulted by me and which therefore inform this research, but which are not necessarily directly referred to and cited.

9.1 ELECTRONIC DISCUSSION LISTS MONITORED

American Library Association, Association of College and Research Libraries SCHOLCOMM Discussion List

<http://www.ala.org/ala/mgrps/divs/acrl/issues/scholarlycomm/scholcommdiscussion.cfm>

American Scientist Open Access Forum

<http://american-scientist-open-access-forum.amsci.org/archives/American-Scientist-Open-Access-Forum.html>

ARROW Repository Group

<http://groups.google.com.au/group/ARROW-repository?hl=en>

Institutional Repositories Community ANZ

<http://groups.google.com/group/institutionalrepositoriescommunity-anz?hl=en>

JISC-Repositories List

<http://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=JISC-REPOSITORIES>

SPARC Open Access Forum

<http://www.arl.org/sparc/publications/soan/index.shtml>

9.2 AUSTRALIAN REPOSITORY PROJECTS

Australian Digital Theses Program Expansion and Redevelopment (ADT).

<http://adt.caul.edu.au/>

Australian Partnership for Sustainable Repositories

<http://www.apsr.edu.au/>

Australian Research Repositories Online to the World (ARROW)

http://arrow.edu.au/adt.caul.edu.au/downloads/ADT_ARIIIC_governance_041.doc

Meta Access Management System (MAMS)

<http://www.melcoe.mq.edu.au/projects/MAMS/>

OAK Law Project: Open Access to Knowledge

<http://www.oaklaw.qut.edu.au/>

9.3 REPOSITORY SOFTWARE

Dspace

<http://www.dspace.org//>

Eprints

<http://www.eprints.org/software/>

Fedora Commons

<http://www.fedora-commons.org/>

Fuller List at the wiki Open Access Directory

http://oad.simmons.edu/oadwiki/Free_and_open-source_repository_software

9.4 BLOGS, WIKIS, NEWSLETTERS, WEBPAGES MONITORED FOR THIS RESEARCH

AuseAccess Wiki

<http://leven.comp.utas.edu.au/AuseAccess/pmwiki.php>

Directory of open access journals

<http://www.doaj.org/>

OakList: information about publishing agreements and publishers' open access policies

<http://www.oaklist.qut.edu.au/>

Open Access Directory Wiki

http://oad.simmons.edu/oadwiki/Main_Page

Open Access News: Peter Suber

<http://www.earlham.edu/~peters/fos/fosblog.html>

Open Access Archivangelism by Stevan Harnad

<http://openaccess.eprints.org/>

PRISM: Partnership for Research Integrity in Science and Medicine

<http://www.prismcoalition.org/index.htm>

Registry of Open Access Repositories (ROAR)

<http://roar.eprints.org/>

ROARMAP (Registry of Open Access Repository Material Archiving Policies)

<http://www.eprints.org/openaccess/policysignup/>

SHERPA/RoMEO: Publisher Copyright Policies and Self-Archiving

<http://www.sherpa.ac.uk/romeo/>

SPARC Open Access Newsletter

<http://www.arl.org/sparc/publications/soan/index.shtml>

SPARC: The Scholarly Publishing and Academic Resources Coalition

<http://www.arl.org/sparc/index.shtml>

The Joint Information Systems Committee (JISC)

<http://www.jisc.ac.uk/>

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