Having a Say: Voices for all the Actors in ANT Research?

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ABSTRACT

This article explores issues associated with giving non-human actors a voice of their own in actor-network theory based research. What issues arise in doing so? Does doing so increase understanding of the issue to hand, bring to life and make more accessible and interesting the stories of these actors? Or does this anthropomorphism detract from the issues at hand? The authors discuss these broader issues and then present findings from an ANT field study which investigated the implementation of institutional repositories and their relations with the spread of open access to scholarly publishing. This paper experiments with allowing some of the non-human actors to speak for themselves. The authors conclude with a discussion which opens the debate: does giving voice to non-human actors bring them to life and make them better understood as intimately entangled with each other and human actors in the socio-material practices of the everyday? And what are the challenges in doing so?

Keywords: Actor-Network Theory, Anthropomorphism, Institutional Repositories, Non-Humans with Voice, Open Access, Scholarly Publishing

INTRODUCTION

Interpretive research endorses and legitimises the voices of people, the human subjects we study in the field. We hear what they think and feel what they feel. But what about non-humans we study, such as information systems (IS), databases, organisations, and other non-humans? In interpretive studies authors let human subjects speak about themselves and the non-humans in their world, make sense of them, and interpret them. As human subjects and researchers have specific goals and intentions and speak from the perspective of their particular situation, they often attribute different meanings to IS or certain types of technology, hence the concept of "interpretive flexibility" (Orlikowski, 1992). The non-humans have no say. In the world of separated subjects (humans) and objects (non-humans), assumed in interpretive studies, our examination and understanding is subject-centered.

In the world of social materiality (Dale, 2005) where subjects and objects are seen as

mutually enacting and co-producing, the gaze is changing. It is not the subject's perspective that is privileged but instead the world is seen as a flat constellation of relations among subjects, material objects such as technologies, and conceptual objects such as ideas. Rather than focusing on the impacts of technology on people and organizations, or the interaction of people and technology, the sociomaterial approach focuses on the subjects-objects and the social-material intertwining and co-enacting in practice (Orlikowski & Scott, 2008; Suchman, 2007). Objects are not passive things without agency. Instead they are seen as actors capable of action and affecting others through relations. The agency of actors, both human and non-human, emerges in their mutual relations through ongoing co-production and co-enactment (Cecez-Kecmanovic & Nagm, 2009). So, the question arises: How do we present objects' acting and how can objects have voice in our understanding and reporting from the field?

We aim to examine this question by adopting Actor-Network Theory (ANT) - one of the most vocal and perhaps most influential theoretical developments in the realm of sociomateriality. ANT was conceived by Latour and Woolgar (1986) while studying the work of scientists in the Salk Institute of Medical Research, and is deliberately agnostic about distinctions between 'social' and 'natural'. Instead ANT theorises the growth of 'hybrids', networks of people, tools and concepts held together by (sometimes unwilling) collaboration (Latour, 1993). ANT has generally been adopted by researchers keen to avoid the subject/object, nature/society dualisms (Vidgen & McMaster, 1996) and thus avoid both technological and social determinism. By proposing a symmetrical treatment of human and non-human actors ANT has a significant potential to contribute to better understanding of technology and information systems in organisations and life in all its rich complexity (Tatnall & Gilding, 1999).

In this paper we propose a conceptual and methodological extension of ANT to allow non-humans to have a voice. We aim first to show that humans and non-humans are co-acting and thereby co-creating each other in actor-networks. Actor-networks are brought together by relations among actors, attempting to enrol each other to enact desired scripts and achieve goals. To investigate the intentions and goals of human actors and their understanding of the emerging network, researchers often rely on interviews and texts (such as e-mails and documents) produced by the humans. This is how we identify and present voices of humans and let them tell their story. But this is only a partial story. The story of non-humans is missing.

On the one hand the humans realise their intentions by acting and interacting through material objects (e.g., technology) which simultaneously shape humans' agency and the ways their intentions are achieved. A non-human or object may be inscribed by the intentions of humans (oriented toward a goal) but such object inscription never acts alone and exactly as intended and continues to act beyond the intended domain and timeframe. The force of non-humans is thus felt everywhere: in a business process enabled by an ERP system, in a paper submission to an institutional repository, which can accept or reject it, when a virus invades your computer. The problem in an ANT study is to let them, the non-humans, speak, let them represent themselves and have a say. But how to do it, how to allow them to speak, is not well explained or practiced in ANT studies. In this paper we present and illustrate a technique of actors' speaking that was used to represent non-human actors (including software, processes and concepts) during a large study of the development of (possibly open access) institutional repositories (IR) in universities (Kennan, 2008). By letting all actors, humans and non-humans tell a story, and specifically by allowing non-humans to relate their own experiences in the network and to express their struggles 'while coming into being', we gain new insights into why the actors interact in the way that they do and why the realities are produced the way they did.

In the following section we discuss previous work on the representation of non-human actors. This is followed by a brief history of,

and motivation for, IR and open access. We then introduce our case study, our research method, and a chronological narrative of the development of the repository. In the penultimate section we show how, with a little imagination, the non-humans can speak. Finally we explain how this technique has helped us to further understanding of the ever changing network, and discuss further questions that are raised by our use of this method.

REPRESENTING NON-HUMAN ACTORS

'How are non-humans to be represented? How are they to be articulated? How do non-humans speak? How can I be assured that I reliably report what they are saying (Pouloudi & Whitley, 2000, p. 341)?' Using IR as an example, we show how by giving, literally, a voice to non-human actors such as 'peer review', 'open access' and repository software, we can clarify our understanding of the place of these actors in the network, and the way they form alliances (or not) with other actors to enable the repository to come into being.

We 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 open access IR depositing makes it legitimate and ethical for an academic to post a published paper in an IR; IR technology that assists academics in posting their papers through a user-friendly interface and efficient back-office processing may encourage IR depositing (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) and enrol them in a network to achieve a particular aim.

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 over time. Such strategy needs to be sensitive to the changes and stories of both the non-human and human actors but most importantly to the dynamics of their relations. In other words, the strategies suggested here should not privilege the human perspective but focus on the intertwining and entanglement of human and non-human actors from both perspectives. For example, journal ranking lists influence academics' selection of publishing outlets; a journal policy that allows post-print open access (OA) depositing into repositories makes it legitimate and ethical for an academic to post a published paper on an institutional repository; IR technology that assists academics in posting their papers through a user-friendly interface and efficient back-office processing may encourage IR self-depositing (academics actions). In each of these cases, it is human beings that create or transform these non-human actors, but how a non-human actually acts only partially depends on the intentions, objectives and interests of the human creators (which are 'inscribed' more or less reliably into the non-human actor). The agency of the non-human actor is occasioned in its relations with other actors (e.g., academics) and therefore also depends on the actors' intentions, objectives and interests. ANT brings to the open the intertwining and entanglement of human and non-human actors involved in relations in the dynamic actor-networks.

When reporting on human actors, researchers usually use extensive quotes from human actors to ground their interpretation and add strength to their arguments. But they always interpret, filter, summarise, and synthesise the data available, running the risk of excluding something critical (to the humans studied), misinterpreting something informants say, and drawing conclusions different from those other researchers with access to the same material may draw (Pouloudi & Whitley, 2000). This

is based on the assumption that there isn't a single 'correct' interpretation. As this is accepted for humans, we question why not also for non-humans? Some authors go beyond reporting and interpreting human actions and articulations. Boland, for example, fictionally places human actors into a room where the limits of language in doing systems work is discussed using their imaginary voices. Boland (2000) explains that he has 'spent some time thinking' about the characters before setting them into a conversation to see what happens. It is obvious that he is deeply familiar with the characters' writing and has immersed himself in their words and the relationship of those words to the issue discussed. He takes this performative approach of putting words into particular actors' mouths to 'make the ideas … come alive just a bit more' (Boland, 2000, p. 48) - and he succeeds. The imaginary dialogue creates an intensely readable and animated work which encourages the reader to think about the issues to hand and perhaps learn something and find paths for future investigation. In this paper we extend Boland's approach by putting words into the 'mouths' of non-human actors in the same way, to compensate for their ability to 'answer back' directly. This does not mean that a researcher is assuming a "god-like" position, as some might suggest. On the contrary, a researcher gets into the position of an object, a non-human in an actor-network, and attempts to see and experience the world subjectively from within.

Generally ANT researchers speak in the third person about non-humans as actors with agency e.g. 'visual basic mounted a challenge', 'Visual basic enrolled …' (Tatnall, 2000), 'the groom is on strike' (Latour, 1992); or we encourage other actors to speak on their behalf. In doing so, however, it is our contention that we lose something. Like Boland (2000) we wanted the actors to 'come alive a bit more', so we thought to experiment with not just talking about the agency of non-human actors but by in a sense anthropomorphising them – giving them a voice of their own. Non-human actors do not have the ability of independent articulation but we can come to know them in other ways, for example by interaction with them, from articulations by human actors about non-human actors and by watching them interact with other actors (Hosein, 2003). Porsander (2005) further develops the idea by giving a voice to an information system so that it may tell its own story. Like Latour (1992) we perceive the non-human actors as constructed or co-opted by humans, substituting for the actions of humans and shaping human action by their affordances and therefore deserving to be represented as richly and fully as possible. Here we experiment with method assemblage, crafting and bundling (Law, 2004) what we have learned about and from actors into depictions which aim to make them come alive.

SCHOLARLY PUBLISHING, OPEN ACCESS AND INSTITUTIONAL REPOSITORIES

Publishing means to 'make public' so it can be read by others, and it is argued that at present the primary form of scholarly communication is via articles formally published in journals and book chapters, or disseminated at conferences. Different actors have different roles within the scholarly publishing environment. Academics and scholars write the articles and are also the main targets as readers of those same articles; they also provide certification through peer review. Journals provide the registration of a work. Multiple organisations provide awareness and accessibility, from the journal publishers themselves to commercial indexing and abstracting organisations and libraries. Libraries also provide archiving and access to wider readerships. Profits are invariably made directly only by the publishers, although one may argue that academics and scholars profit indirectly, through increased reputation, grants, tenure, promotion and so on (Kling & Callahan, 2003).

ICT developments have created high expectations for improvements in scholarly communications and scholarly publishing.

From the 1990s it was envisaged that electronic publication would make materials available to readers in all locations 24 hours a day, ensure that costs would be lower, make publication timelier, and enable a wide variety of document and data formats and other media to be included. This would lead to participation in scholarly publishing being more open and democratic and the papers being available to a wider audience (Harnad, 1999; Willinsky, 2006). Against these expectations, with the development of electronic publishing the costs for scholars, universities and other institutions accessing these journals are steadily rising, often faster than the rate of inflation (Van Orsdel & Born, 2008). The new technology has emphasised the tensions between researchers who use publishing to advance enquiry, share findings, influence others and generate impact, and publishers who profit from the sales of subscriptions to libraries, aggregators and individuals (Clarke & Kingsley, 2008).

In response to this tension an 'Open Access' (OA) movement has formed, primarily driven by scholars and librarians and the Internet and the World Wide Web (WWW), to promote the open access vision to scholarly works, enabling scholars and other interested readers to 'read, download, copy, distribute, print, search or link' (Budapest Open Access Initiative, 2002) to the full text of works, without financial, legal or technical barriers. As the OA vision spreads it attracts other actors into its vision of freely available research: research funders, software developers, disciplinary communities, research institutions and even publishers. OA does not have a single organisation or society promoting or supporting it. There is a loose cluster of advocacy and activists, organisations and individuals, which we refer to loosely as the OA movement.

One way to provide OA is the institutional repository (IR). Many studies have found that increasingly universities around the world are implementing OA IR (Lynch & Lippincott, 2005), but actual growth in content has been very slow (McDowell, 2007). The case studies on which this paper is based were undertaken

for just this reason - to understand why the number of contributions to a repository in a particular institution was growing much slower than expected.

ASSEMBLING ALLIES FOR REPOSITORIES: THE CASES

The Institutions and the Repositories

The research was undertaken in a leading Australian university (Janus) with around 40,000 students, 6,000 staff, and a library with over two million items. A second Australian university (Jupiter) of similar size was included in the original study, because its IR implementation was more advanced and researchers were familiar with using it, and with the ideal of open access. At the beginning of the study Janus University was in the early stages of IR implementation, one of many of the 39 Australian Universities that were implementing or were considering implementing institutional repositories. Once the project had been set up development and implementation was expected to take three years, but Table 1 shows Janus's original plan was highly optimistic.

Jupiter had an even more optimistic plan, to implement an OA IR in the space of one year. The project was implemented within its time frame. 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 2 below presents the timeline for the Jupiter University IR implementation.

Data Collection and Analysis

This large research project started with an investigation of OA and IR in general, and the two case studies were seen as an example with which to illuminate the general relationships of IR and OA. The lead author conducted the study in both universities. The Janus IR project was traced from its early stages throughout its implementation and testing. The study of Jupiter University IR began after implementation, so

Table 1. Janus University IR implementation timeline

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 etc.
Phase 2	January 2005 - December 2005	Deploy	Merged demonstration and deployment **May 2006** Project Manager 2 appointed. Demonstration and some deployment. **June 2007** Project Manager 3 appointed
Phase 3	January 2006 – December 2006	Distribute	**December 2007+** Distribute – soft launch announced at Academic Board.
Postscript	2008+		Actual distribution **January 2008+** Outreach librarians promote to researchers. As at October 17 2008 2,425 deposits.

Table 2. Jupiter University IR implementation timeline

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

historical information about the implementation and current usage data were collected. The ANT approach led to following the actors, not just through the local implementation in a university, but through to the more global relations in publishing practices. Investigation of the emergence and reconfiguration of actor-networks led to further actors, human and non-human, who needed to tell their story.

Stories were collected via interviews, documents, observations of actors and interaction with IR. Interviews were conducted

with 32 human actors from Janus and 20 from Jupiter. At first the interviews and other texts were analysed in the usual way – following the actors, understanding their interests and actions, and thus revealing emergent, complex networks of relations. As research progressed human and non-human actors formed and changed alliances, such as those among OA activists, researchers, journals, OA IR and, research papers, thus creating and reconfiguring actor-networks. Description of these actors, their actions and their relations tended to be from the viewpoint of human actors, similar to most ANT studies. Despite an explicit attempt in most ANT studies to treat human and non-human actors equally, non-human actors were not represented as richly and as authentically as human actors. The problem was to present all actors as if from their perspective, to let them speak using their own voice and tell a story that is true to them. To do this we use a technique of actors' speaking (Kennan, 2008) that we describe in the next section.

When describing the interactions in the network we felt that there was no suitable way to represent non-human actors as richly as the humans were represented through extracts from interviews and texts, so we had to (re)invent one. Following Porsander (2005) we give non-human actors a voice of their own, that they may "tell" their own story. Using example from our scholarly publishing case we meet the actors, many of whom appear in both cases. We experiment with an "assemblage", crafting and bundling (Law, 2004) what we learned in our field study about and from the actors into stories that generate their presence and give them a voice. In the following section we give examples of this, and then discuss the advantages and possible application of this method. Our aim is to present an interesting and lively story, informed by our observations, and interactions with the actors which will assist in increasing understanding without implying "correctness".

THE ACTORS SPEAK

Using Boland's (2000) terminology we have 'spent some time thinking' about the non-human characters in this story. Further, we spent some time being with them, interacting with them. We craft what we have learned from hearing other actors talk about their relations with them in interviews and texts, from interrogating them ourselves, and from observing them interact in their relations with other actors in the story. From these experiences we imagine articulation from their point of view, for them to state their positions, so we can try to hear what they could tell us, had they the power of speech.

A Research Paper

I can take many different forms. I may be a journal article, conference paper, book chapter. I may be written on paper or in electronic form or both. I may be MS Word, LaTex, pdf or HTML or other. I am born from the writing up of research and the thinking and theorising of my authors. I may be distributed in journals, books, proceedings, via the Internet, e-mail, weblogs, repositories, in pre-print, post-print, re-print. I am written by scholars, for scholars in a way that is inaccessible to practitioners or patients or other 'outsiders'. I am written to enable the sharing of knowledge within a scholarly community. My authors give me away to journals to publish.

My value is increased by being read, by being published, so authors give me away for free, even though my birth may not be easy. I am a child given up to the adoptive parents of a journal so that my life and my authors' life may be better. Sometimes the journal I am published in has a very small readership. I then have less chance of being found and read by potential readers. If my authors deposited me in an open access IR as well as publishing me, I would have more chance of being read. I do not understand why they do not deposit me in an IR, when the journal or conference they publish

me in permits this, which as of the 28ᵗʰ May 2009, 60% of publishers permit (http://www.sherpa.ac.uk/romeo.php?stats=yes).

I can also experience difficulties in getting published. Sometimes my content is cross disciplinary or in a new and emerging field and no specific journal is right for me. My authors struggle to find me a journal parent. Sometimes I am 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 I am 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. My authors and readers sometimes rank me according to where and how I appear rather than for my own content and contribution to knowledge.

Sometimes I am very unlucky and I don't get published at all. I remain stillborn as a pre-print or working paper, unpublished, and unloved – sadly because my whole purpose is to be published and to be read, to add to the scholarly corpus, to be cited and not to languish in the dark.

Peer Review

I am peer review. I am also sometimes called refereeing. I have the power to decide which papers get into journals, conference proceedings and research books. I am usually performed by a group of experts, called reviewers, who read papers and perform a supposedly impartial review of them, their 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. Authors appreciate the quid pro quo nature of refereeing and being refereed and the feedback I provide them when I am in a good mood – an honest, fair and constructive report that enables paper improvement.

There is a tension in my identity. I am not always one. There are tensions within me. Sometimes I can be in a bad mood and then I am not without my critics. This can make me overly harsh and critical of the papers I review. Sometimes I band with friends who think the same way I do and we form cliques and hierarchies that are difficult to break into or overcome. Although reviews are 'double blind' often I can recognize an author by the nature of their contribution. Where review is not double blind the temptation to allow my own ideas and mood to influence my judgment sometimes overrides my natural good sense. Sometimes too, I can make a mistake, or miss one, rejecting a new, unusual or innovative paper or allowing a paper to go through that perhaps should not.

To increase my transparency sometimes I practice "open review". In fields where preprints are deposited in open access repositories authors are inevitably known to reviewers, and some journals accept this, and even encourage the search for good papers from preprint repositories. Despite, or because of, the open nature of the review I can be fair and constructive in my feedback to authors. I don't think OA will compromise my role as some claim, merely change the detail of how I am performed.

A Chorus of Journals

We are scholarly journals. We publish papers that are peer reviewed and relate to a particular academic discipline, field or sub-field. We have many similarities, we also have many differences. Here we talk about the things we have in common but you, the reader, need to be aware that differences also apply between those of us from different disciplines, countries or cultures. Authors submit their papers to us. Editors read them 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 formally, sometimes informally. Our quality and impact are also assessed, sometimes quantitatively, sometimes qualitatively. Researchers can be very strategic about selecting those of us in which to publish

their work. Established authors understand the complex relations between we journals in their field, and the differentiations of ranking and reputation in our highly stratified society.

Each of us aims for a different audience of readers and authors. We battle with each other to keep and improve our audience and our reputation. Our audiences may be researchers' academic peers, specific fields and sub-fields within disciplines, practitioners, students, even the interested lay-person. We depend on peer review and on the papers submitted for publishing. We seek high quality papers and allocate the task of selecting good papers to peer review.

We try to serve two masters, the academic community of authors and readers, editors and reviewers who wish to widely distribute their research and knowledge (and build their reputations) and the commercial and learned-society publishers who want us to make them a profit. It is difficult and we are torn by our responsibilities to both.

Open Access

I am research and scholarship freely available over the Internet. I am partially enacted. Estimates vary. Some say I make between 11% (Björk, Roosr, & Lauri, 2008) and 15% and 20% (Swan & Carr, 2008) of research and scholarly work freely accessible. I am a vision. I have the ability to conceive what might be achieved, what is possible. I am a highly imaginative scheme or an anticipation. I express some foresight. I am explained by the Budapest OA Initiative thus:

By "open access" 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 ... 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 un-reviewed preprints that they might wish to put online for comment or to alert colleagues to important research findings (Budapest Open Access Initiative, 2002).

Sometimes I am a vision (Budapest Open Access Initiative, 2002) and sometimes I am a strategic enabling activity, on which research and inquiry will rely (Open Access and Research Conference, 2008)

I am not one. Willinsky (2006) has identified ten flavours of open access. I am multiple and yet I cohere. I inspire journals to become open access and enrol them in my actor-network. I also work with closed access journals inciting them to allow authors to deposit versions of their papers in open access repositories[1]. I motivate authors to publish their work OA in institutional or disciplinary repositories before or after they publish in official journals. By doing so I annoy publishers who do not know how to deal with me. I work hand in hand with these repositories to make these works widely available, thus increasing their readership and citations. This is how I am enacting my vision and growing my OA scholarly publishing actor-network.

A Chorus of Institutional Repositories

We are open access institutional repositories. We are online archives. We are a type of digital library and work with the Internet and web technologies. Our role is to collect, preserve and make freely accessible the research output of the university. That research output may be any kind of paper, or any other product of research. We make them all available to the world. Readers

of any kind are welcome to read the work we hold. We rely on information managers to help us look after the content we hold, researchers to put their work into us, software developers to maintain and develop us, and institutions to keep us running. And then we work with the Internet and search engines to provide access to and distribute the papers. Some see our role as primarily to provide OA, but others find other roles for us. Each one of us is different.

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 me. 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. I am both software platform and information architecture. I like the idea of being free and open source. It is congruent with my role of providing free and OA to the research output of my university. At the time my story begins at Janus University, Fedora was a repository engine, with deep and rich functionality (Payette & Lagoze, 1998). But I did not provide an out-of-the-box experience. To do something useful with me, someone had to write additional software (Treloar, 2005). For many reasons from the practical to the philosophical, my implementers 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. There were many features I and my implementers wanted to provide our researchers, but these developments took time. Sometimes I felt a conflict between the open nature of my underlying repository and my OA mission and the proprietary nature of my user interface.

I experienced internal conflict in another way. My implementers started out with a truncated version of OA. At the outset they focused only on research 'not published in the usual way' such as working papers, technical reports and other grey literature.

[We] never went looking for preprints and postprints 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]?

This focus limited my ability to engage researchers with the benefits of OA generally and actively put off those already imbued with the OA vision for their journal and conference papers. Some of those researchers were instead attracted to other methods of achieving OA, such as the disciplinary repositories SSRN, REPEC and arXiv. It held back the spreading of my wings.

My implementers did not want to announce me until I 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].

The road to "shiny" took longer than expected. I would have been willing earlier to accept more research output, but my human colleagues thought I was a bit messy and difficult. This caused them 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 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. My users tell me they miss these features. Researchers place their 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. However I am reliant on my human colleagues to register me with Google Scholar which they have not yet done. Or at least I think they have not, as papers I hold do not appear there. As at May 2009 I hold 4,430 items. I cannot tell which are full texts and which are metadata only, but 1,581 are PhD theses and 310 Masters by Research theses. Only 550 items were deposited for 2008.

EPrints - An Institutional Repository

I am named after the EPrints free software on which I am built. I like the idea of being free. It is congruent with my role of providing free and OA to the research output of my university. 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.

In my university my becoming was widely announced. The congruence with the university's research mission was made explicit and a policy was instituted to require authors to deposit their work with me. In the OA world this policy is known as a mandate. Every year, academics are required to deposit copies of their published journal articles and conference papers in me. Wherever possible by agreement with the journals and conferences these are available open access. I now (May 2009) have 14,457 items in me and 2,158 people who deposit. 8,828 of those items are open access. 2,252 items were deposited in 2008. Most of my university's authors love my work. When they search their field in Google or Google Scholar they are delighted to see their own works, often near the top of the list of returns. They regularly check my statistics to see how many times their papers are downloaded. They link to their works in me via their email signatures and web pages. Some have even cited my usage statistics in their promotion applications. Some do resent the mandate or have reservations about open access, but mostly my relations with my university and my authors are friendly.

I feel supported and sustained by my relations with the university mission and the policy. More globally Eprints, my software, as opposed to Eprints my self, 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/].

WHAT DO WE GAIN?

By allowing the non-humans to speak, by presenting the story from numerous actors' viewpoints, we can better describe contradicting developments in OA scholarly publishing and thereby contribute to better understanding of the transformation of scholarly publishing practices and the role that the introduction of an OA IR plays in this transformation.

What does it mean giving non-human actors a voice? They cannot talk or express themselves like humans. So we give them imagined voices based on our experiences of their worlds and their interactions with other actors (including interactions with we researchers). We imagine, for instance, how papers experience the world around them – the authors, journals, peer review and university policies.

When we let the actors speak what do we hear? When actors are given the opportunity to speak for themselves do they appear more alive and lively than they do when spoken of in the third person? Can we learn more about and better present the life of the actor-network which we are researching when we do so? We think so. Their voices resonate. The open access, research papers, peer review, journals and institutional repositories come alive as they speak, firmly and in the first person, as actors. Sometimes they use quotations from interviews (e.g., academics) or documents (e.g., the Budapest Open Access Initiative) to add to the authenticity of their speaking. Importantly each actor presents their position in and their view of the transformation of scholarly publishing.

We have faced challenges in finding the "right" voice to present. There are multiple voices that arise from our engagement and relations with the non-human actors in this story. Like humans, non-human actors such as atherosclerosis (Mol, 2002) are not singular and they emerge through different relations with us, the authors, and with other actors in the story. The non-human actors in this story are, of course, networks in themselves with their own parts (actors) and histories. We can't study everything at once, our current focus is to increase our understanding of open access in universities by listening to some of the non-human actors in these stories. Thus we have tried to give voice to those different relations and the tensions that arise from our interactions with these actors in our investigations of open access.

This animates the non-humans, gives them identity, and makes coherent their relations with other actors. Thus papers aim to be adopted by journals, they want to be read. They don't want to languish unread and un-cited. Their relationship with peer review is equivocal, as is their relationship with journals. Peer review rejects many papers. Peer review – traditional scholarly publishing's ally – is intended to ensure quality assurance, but it is far from being perfect (its honest voice is so refreshing). Journals only publish some papers. Some journals have such a small readership or subscription base that being published in them sometimes prevents papers from being widely read. Open access expresses itself as a vision that can work with existing actors in scholarly publishing to enable papers to become more accessible to their readers. From the actors' voices we can more clearly see that the peer review would not necessarily be compromised by OA.

Animating new actors such as institutional repositories allows us to better understand how they work with allies such as the Internet and the WWW to collect, preserve and make freely accessible research output such as papers. But their coming into being is not always easy. We learned about two different IR life stories. One by JanusWorks expresses internal conflict: based partially on proprietary software, a limited OA vision expressed by its human colleagues holding back its acceptance within its academic community. The other, EPrints from Jupiter University, speaks to us in a confident voice, supported and sustained by congruence in its use of free software, its explicit relationship with its university's research mission and supported by policies and a strong community.

In our study of IR listening to the voices of the non-human actors helps us to better understand the transformation of scholarly publishing from within, the internal conflicts

and contradicting developments. From other actors and from the IR themselves we hear genuine stories how IR are emerging as new actors impacting on this transformation. We can see ePrints, a happy institutional repository, built on a software and inscribed with a mission aligned to the institution's objectives. We see how it works with the authors and papers of its community to help them achieve their ends. We also experience the struggles of JanusWorks as it attempts to become an institutional repository. The stories of non-human actors together with those of human actors help us understand better the ongoing transformation of publishing practices, and the contested alignments and struggles in the enactment of OA vision through conscripting institutional repositories to a program of making research papers open access.

CONCLUSION

Our contribution is twofold. First we illustrate in our narrative the coming alive of actors and their stories. We are more likely to hear human and non-human alike, when they are given the opportunity to speak for themselves. Just as we follow the relations among humans through their voice, so we are better able to follow the relations among non-humans when we hear their own voice, instead of only seeing them separately through human eyes. Secondly, in listening to the actors speak we find messages that can be obscured in other forms of narrative, and this may help universities, librarians, and others in making decisions about how they might implement their repositories. Many of the actors appear in the implementations of repositories and in scholarly publishing and have a presence in universities including both the case universities. We see that they inhabit multiple networks and are closely related to each other. The actions of one influence the actions of another, but they each have their own stories. The stories provide additional and intertwining narratives as counterpoint to the usual narrative

of two central actor's becoming (in this case the repositories), adding meaning to the interactions of these actors with other actors. For example, listening to the voices we realised a tension in papers between informing and recognition, and how this can influence their relations with authors, journals and IRs. We hear the voices of peer review – both friend and foe to papers and authors.

We understood the ambiguity that Janus-Works had towards OA reflected a tension in the history of the JanusWorks software as a commercial package built on an open source platform. JanusWorks infers that this ambiguity was reflected in its relations with key human actors such as authors and the university librarian and contributed to its slow growth. On the other hand EPrints felt strong congruence between its name, the nature of its open source platform and open content, its purpose and its ability to work with its university to help achieve the university's mission. Listening to the voices of two repositories, one struggling with ambiguity and uncertainty into existence; the other congruent and stable can provide universities, librarians and other implementers with information to inform their repository development. Congruency, a lowering of ambiguity, the support of policies as well as human actors within the project appears in these cases to contribute to speed and success of implementation.

There is much work yet to be done in understanding how particular interactions of the narratives can be described. There is also the possibility that allowing non-humans to speak might lead to a better understanding of how their scripts evolve with the network (Latour, 1992). Furthermore, it will be interesting to explore the emergence of non-human actors' relations with other actors (human and non-human). Presenting relations from different actors' views may reveal hidden conflicts and contradictions. Allowing contending stories to be heard in the voices of the actors and to intertwine might open the way to represent the true multiplicity of realities (Law, 2004, p. 152).

REFERENCES

Björk, B.-C., Roosr, A., et al. (2008). *Global annual volume of peer reviewed scholarly articles and the share available via different open access options.* Paper presented at the Openness in Digital Publishing: Awareness, Discovery and Access - Proceedings of the 12th International Conference on Electronic Publishing (ELPUB2008), Toronto, Canada.

Boland, R. J. (2000). The Limits of Language in Doing Systems Work . In Baskerville, R., Stage, J., & DeGross, J. I. (Eds.), *Organizational and Social Perspectives on Information Technology* (pp. 47–60). Boston: Kluwer Academic.

Budapest Open Access Initiative. (2002). *Budapest Open Access Initiative.* Retrieved April 7, 2006 from http://www.soros.org/openaccess/

Cecez-Kecmanovic, D., & Nagm, F. (2009). Have you Taken your Guys on the Journey? An ANT Account of Information Systems Project Evaluation. *International Journal of Actor-Network Theory and Technological Innovation*, *1*(1), 1–22.

Clarke, R., & Kingsley, D. (2008). ePublishing's Impacts on Journals and Journal Articles. *Journal of Internet Commerce*, *7*(1), 120–151. doi:10.1080/15332860802004410

Dale, K. (2005). Building a social materiality: spatial and embodied politics in organizational control. *Organization*, *12*(5), 649. doi:10.1177/1350508405055940

Harnad, S. (1999). Free at Last: The Future of Peer-Reviewed Journals. *D-Lib Magazine*, *5*(12). Retrieved from http://www.dlib.org/dlib/december99/12harnad.html.

Hosein, I. (2003). A Research Note on Capturing Technology: Toward Moments of Interest . In Whitley, E. A., Wynn, E. H., Myers, M. D., & DeGross, J. I. (Eds.), *Global and Organizational Discourse about Information Technology* (pp. 133–154). Boston: Kluwer Academic Publishers.

Kennan, M. A. (2008). *Reassembling scholarly publishing: open access, institutional repositories and the process of change.* Unpublished doctoral thesis, The University of New South Wales, Sydney, Australia. Retrieved from: http://unsworks.unsw.edu.au/vital/access/manager/Repository/unsworks:3488

Kling, R., & Callahan, E. (2003). Electronic journals, the Internet and scholarly communication. [ARIST]. *Annual Review of Information Science & Technology*, *37*, 127–178. doi:10.1002/aris.1440370105

Latour, B. (1987). *Science in action*. Cambridge, MA: Harvard University Press.

Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artifacts . In Bijker, W. E., & Law, J. (Eds.), *Shaping Technology/Building Society: Studies in Sociotechnical Change* (pp. 225–258). Cambridge, MA: MIT Press.

Latour, B. (1993). *We have never been modern*. New York: Harvester.

Latour, B., & Woolgar, S. (1986). *Laboratory Life: The Construction of Scientific Facts*. Princeton, NJ: Princeton University Press.

Law, J. (2004). *After Method: Mess in Social Science research*. London: Routledge.

Lynch, C. A., & Lippincott, J. K. (2005). Institutional repository deployment in the United States as of early 2005. *D-Lib Magazine*, *11*(9). Retrieved from http://webdoc.sub.gwdg.de/edoc/aw/d-lib/dlib/september05/lynch/09lynch.html. doi:10.1045/september2005-lynch

McDowell, C. S. (2007). Evaluating Institutional Repository Deployment in American Academe Since Early 2005 Repositories by the Numbers, Part 2. *D-Lib Magazine*, *13*(9-10). Retrieved from http://dlib.org/dlib/september07/mcdowell/09mcdowell.html.

Mol, A. (2002). *The Body Multiple: Ontology in Medical Practice*. London: Duke University Press.

Open Access and Research Conference. (2008). *The Brisbane Declaration.* Retrieved from http://www.oaklaw.qut.edu.au/files/Brisbane.Declaration.pdf

Orlikowski, W. J. (1992). The duality of technology: Rethinking the concept of technology in organizations. *Organization Science*, 398–427. doi:10.1287/orsc.3.3.398

Orlikowski, W. J., & Scott, S. V. (2008). *The entangling of technology and work in organizations (Tech. Rep.)*. London: London School of Economics and Political Science.

Payette, S., & Lagoze, C. (1998). Flexible and Extensible Digital Object and Repository Architecture (FEDORA). In *Proceedings of the Second European Conference on Research and Advanced Technology for Digital Libraries* (LNCS 1513), Heraklion, Crete, Greece.

Porsander, L. (2005). My Name is Lifebuoy: An Actor-Network Emerging from Action-net . In Czarniawska, B., & Hernes, T. (Eds.), *Actor-Network Theory and Organizing* (pp. 14–30). Copenhagen, Denmark: Copenhagen Business School Press.

Pouloudi, A., & Whitley, E. A. (2000). Representing human and non-human stakeholders: on speaking with authority . In Baskerville, R., Stage, J., & DeGross, J. I. (Eds.), *Organizational and Social Perspectives on Information Technology* (pp. 339–354). Boston: Kluwer Academic.

Suchman, L. (2007). *Human-Machine Reconfigurations: Plans and Situated Actions* (2nd ed.). Cambridge, UK: Cambridge University Press.

Swan, A., & Carr, L. (2008). Institutions, Their Repositories and the Web. *Serials Review*, *34*(1), 31–35. doi:10.1016/j.serrev.2007.12.006

Tatnall, A. (2000). *Innovation and change in the information systems curriculum in an Australian University: A socio-technical perspective*. Queensland, Australia: Central Queensland University.

Tatnall, A., & Gilding, A. (1999). *Actor-Network Theory and Information Systems Research*. Paper presented at the 10th Australasian Conference on Information Systems (ACIS), Wellington, New Zealand.

Treloar, A. (2005). *ARROW Targets: Institutional Repositories, Open-Source, and Web Services*. Paper presented at the AusWeb05 the Eleventh Australasian World Wide Web Conference. Retrieved September 13, 2005 from http://ausweb.scu.edu.au/aw05/papers/refereed/treloar/

Van Orsdel, L. C., & Born, K. (2008, April 14). Periodicals Price Survey 2008: Embracing openness. *Library Journal*. Retrieved from http://www.libraryjournal.com/article/CA6547086.html

Vidgen, R., & McMaster, T. (1996). *Black boxes, non-human stakeholders and the translation of IT through mediation*. Paper presented at the IFIP WG8.2 Working Conference on Information Technology and Changes in Organizational Work, Cambridge, UK.

Willinsky, J. (2006). *The Access Principle: The Case for Open Access to Research and Scholarship*. Retrieved from http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=10611

ENDNOTE

[1]   Sherpa/Romeo (http://www.sherpa.ac.uk/romeo/) documents which journals allow authors to deposit their papers in OA IR and estimates that at the moment it is around 60% of publishers (http://www.sherpa.ac.uk/romeo.php?stats=yes).

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