

Information management research in a multidisciplinary context *

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Abstract

The content of the research undertaken by the Information and Telecommunications Needs Research group and the Centre for Community Networking Research, in the School of Information Management and Systems at Monash University, is multidisciplinary in scope. It is diverse in its coverage and shows how researchers adapt to different practical needs, such as working efficiently while travelling separately at times, or appreciating different cultural norms of all manner of professional practitioners. Encompassing various disciplinary collaborations has many advantages. It does not fit neatly in a confined library and information management box. This paper describes an illustrative selection of three large, recent, applied research projects by the two centres, and discusses the advantages and challenges that accompany multidisciplinary undertakings. Researchers in the centres tailor projects to the needs of target groups, and form strong partnerships with researchers and subjects based in other disciplines. A good deal of trust is engendered in the achievement of mutual benefits. In chronological order, the three projects described are:

1. International Olympic Committee (IOC): The IOC headquarters in Lausanne, Switzerland, commissioned a team of researchers in 2001 to advise on its internal knowledge management processes, and efficiencies in the transfer of Olympic knowledge and expertise from one official games to the next. Our team (the three authors of this paper) worked with sports professionals, information managers, systems designers, archivists, logistics experts, security personnel, public relations staff, and business strategists to provide a consultancy report (International Olympic Committee, 2001).
2. Online investors: With law researchers, in 2002 this project explored the limitations of present legal regulation to provide protection for investors in the online environment (Kingsford Smith & Williamson, 2004). The content of sites offering online investment information and advice were analysed. The research also analysed the needs, experiences, knowledge and understanding of investors, particularly with regard to information, advice and financial risk. As well as taking advantage of online information, online investors also used non-Internet information and advice extensively, especially from inter-personal sources. An overall aim of this project was to develop recommendations for law reform.
3. Repository of digital learning objects: Three Australian universities and Australian industry partners developed a system of core teaching resources for the education of software, network, and application developers. The materials and resources – put in a learning repository – were designed for use by the participating institutions in teaching at undergraduate, postgraduate, and professional development levels (Bell & Schauder, 2003). For the system designers and the main government funding body, in 2003 our team undertook a thorough evaluation of the degree of usefulness of the two-year-old system from the perspective of the prime target group – academic users.

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Introduction

The paper is in five main sections. At the start, the reasons for adopting multidisciplinary in research in Australia are explored. Then incidences of involvement by Monash University, and the School of Information Management and Systems (SIMS) in particular, are described. In spite of the alliance with other disciplines, the three projects presented in this paper are all based on one set of fundamental research philosophies and methods, summed up as 'user needs analysis'. These common principles are described in some detail. A description of each of the three projects follows, designed to illustrate the ideas set out in the prior discussion in the paper. We conclude that multidisciplinary research is beneficial in many ways to information management and the collaborating disciplines.

Reasons for multidisciplinary approaches

SIMS, in the Faculty of Information Technology (FIT), at Monash University, has adopted the view that a major research contribution can be made, not only to our discipline but also to other fields, through an involvement in multidisciplinary research. Rather than fear that such an approach dilutes our contribution or weakens our relevance, we believe that the contribution of information management researchers is enhanced by any impact that we can make on other disciplines. Just as most mainstream activities become increasingly global, so disciplines of all kinds become less able to maintain their formerly sacrosanct territories, with minimal reliance on other fields – even such disciplines as law and medicine. Moreover, the involvement with other disciplines brings a greater understanding of our own discipline, as will be shown, and how we can contribute to other worlds of research-generated knowledge.

Information managers have been driven by professional commitment to understanding all parts of the universe of ideas for a long time. In practice, librarianship, and more recently information management, and its relations, have for decades shared goals amicably with a range of disciplines. One needs look no further than the expertise of special libraries within specific organisations – such as hospitals – to realise that cross-disciplinary understandings have flourished for a long time (Johanson, 2004). Reference librarians, who have subjected themselves to answering questions from the general public on any topic whatsoever, are well aware of the necessity to understand the ways in which different creators of knowledge think and act (Johanson, 1997).

The collaborative nature of librarianship continues to expand, based on recent research, which conjures up new roles for information professionals to actively support high-level managers in large organisations, with different disciplinary preoccupations (Kirk, 2004). In this research, information professionals are encouraged to act as executive information analysts, monitoring the organisational politics, and finding ways to overcome cultural barriers which prevent effective information flows. Such ideas reinforce the strength of our adopted philosophical approach, which aims to ensure deep understandings of occupational settings.

Yet multidisciplinary research, involving information management and other disciplines, is rare. Our professional practice has not been bolstered by much exploration of useful research theory or method. A search of the available literature for the past 20 years reveals a mere handful of articles worldwide. All of them describe actual research projects, not critiques of a multidisciplinary research process itself. They cover joint research undertaken by librarians alongside communications academics (no need for intellectual détente there!), a few case studies of information-seeking behaviours in specific disciplines (e.g., engineering, botany), and one analysis of co-citation of disciplines in bibliographic databases. That is all.

The need for alliances has been made **for** Australian academic researchers today, to some extent. There can be no argument that tertiary education has become an industry (Marginson & Considine, 2000) – the third largest in terms of national export earnings, as our Minister for Education is proud to declare (Nelson, 2003). A steady decline in ‘public’ funding for tertiary education over the past two decades has taken us backwards with resources (Australian Department of Education, Science and Training, 2002), causing a decrease in the number of individual disciplinary units within every university. Thus librarianship merges with archives and records management, or communications studies, or knowledge management, or education, or business systems, or into some other conglomerate. In parallel, for the purpose of economic ‘rationalisation’, an amalgamation of tertiary institutions, faculties, schools, departments, and work units, is aimed to achieve even further efficiencies.

Around the same time, a trend in research towards collaborative teams emerged. Whereas up to the 1980s it was common for academic researchers to undertake worthwhile small research investigations alone, as noted by Rochester and Vakkari (1998), such behaviour is regarded now as anathema, as working against the academy’s best interests. The need now is for research teams which successfully win government funding for projects with immediate practical benefits. The alternative for university researchers is to seek industry funds, and unfortunately information management is not well endowed with either financial largesse or benefactions.

It is also pertinent to note in relation to the life-cycle of disciplines and research generally, that disciplines are self-regenerative always, in order to survive change, often pruning off parts which become moribund, producing or adopting new theories and methods which benefit new research objectives (Becher & Trowler, 2001). It is sometimes beneficial to a research group to graft on new branches (or research partners), borrowed from other disciplines. A sort of ‘methodological revolution’ and re-direction occurs in most areas over time (e.g., in economics (Coyle, 2004), or teaching (Nixon, Martin, McKeown & Ranson, 1997)).

In this paper we argue that, if we put external financial and political pressures to one side, and pass over disciplinary reconstructions, there is still a range of advantages in researching in multidisciplinary teams. Involved are subjects from

across disciplines and professions and the adaptation of our own paradigms, methods, tools and data to assist with others' needs. This sort of collaboration leads to an enrichment of the experience of all of the participants, and provides the opportunity for original discoveries, some of which would be impossible without collaborations. It also helps to build a sufficient track record and global research network for us to make fervent supplications for additional research work. More benefits are enumerated in the ensuing discussion.

Monash projects

Over the past decade there have been numerous examples of multidisciplinary research in SIMS, much of it undertaken through the two research groups, ITNR (Information and Telecommunications Needs Research), which is a joint initiative of the SIMS at Monash University, and School of Information Studies at Charles Sturt University, and CCNR (Centre for Community Networking Research), which is a totally SIMS research group. ITNR and CCNR are part of the largest IT faculty in the country. The declared rationale for one of the four research specialisations in the Faculty of Information Technology, 'Social Computing', of itself implies collaboration:

Social computing research focuses on the information and knowledge needs of people, and how these can be met across time and place with the aid of appropriate information technologies. Fundamental to social computing are issues of communication and recorded memory. It seeks to:

- Improve enterprise and interpersonal information flow and recorded memory through the development of theory, models and tools for the analysis, design, development, use and management of information systems, products and services, particularly in e-business, e-government and virtual communities.
- Improve how people create, manage, categorise, seek, obtain, evaluate, and use information.
- Break down barriers to satisfying the information and knowledge needs of people and to extend their use of information and information technologies (Schauder, 2003).

Some of the research areas within Social Computing include: community informatics; decision support systems; e-business and e-government; electronic recordkeeping and archiving; information systems development; IT governance; knowledge management; metadata; mobile commerce; virtual communities; computer education; network computing; and business systems. Thus the opportunities for collective disciplinary projects are numerous, and some of them are described in this paper.

A brief explanation of the selection of cases in this paper is necessary. In order to substantiate our argument about multidisciplinary, it was thought best to describe more than one example; presenting only one case might leave us open to the charge that we were too narrow and selective. More than three cases were considered, but the draft text expanded too much with such. Thus we aimed to strike a balance between providing enough information on three chosen cases to mount a sufficient argument, while still conforming to the necessary space requirements.

Although none of the three projects selected for inclusion involve libraries directly, we do not neglect research in that area, and separately we have undertaken research projects connected with library and information studies alone.

As further comment on the selection of the presented projects, it is important to note that a variety were available for us to choose from. The authors of this paper have a wider involvement with other academics in SIMS – researchers who are from disciplines other than information management altogether. Two major examples are Australian Research Council projects, the first being A User Sensitive Portal to Breast Cancer Knowledge Online which involves an information management chief investigator (specialising in information needs and information-seeking behaviour), along with metadata and information systems experts, Williamson & Manaszewicz (2002), from the first phase, and Malhota, Burstein, Fisher, McKemish, Anderson & Manaszewicz (2003), from the second, and medical researchers. Another example is Trust and Technology: building an archival system for Indigenous oral memory which, once again, involves information management personnel along with metadata and computing experts, anthropologists, archivists, community developers, social activists, and media creators. This project began recently.

The first project described in this paper was undertaken in partnership with the International Olympic Committee, with our involvement focusing on an extensive analysis of the information and knowledge needs of the Olympic community. The outcome was to be better knowledge management for the organisation (and partners) for the running of the Olympic Games. The project involved our working with people with a range of backgrounds, especially those with expertise in the fields of sport and management.

The second project, undertaken by ITNR in partnership with a Monash professor of law, concerned the information-seeking behaviour of both traditional and online investors with a view to understanding the implications for future legal regulation of online investment. This project joined theory from both law and information management, together with empirical experience from the latter, resulting in contributions to both fields.

The third project, evaluated a system titled 'Building the Internet Workforce', funded primarily by the Department of Education, Science and Training. The project involved the Faculty of Information Technology at Monash University, and the Universities of Queensland and Sydney. The aim of 'Building the Internet

Workforce' was to develop and provide a repository of teaching resources for the educators of software, network and application developers. Our evaluation of the repository therefore involved working with IT specialists, understanding their approaches to teaching and learning, and determining how effective they believed the prototype system to be. The primary question was: how useful is the system for users, i.e., did academic teachers find it helpful? This is not an uncommon sort of research question in information management, or information systems for that matter, but in this case the users presented very fulsome critiques, raising a very large number of important issues. The technical viability of the learning repository was evaluated also by a systems analyst.

Common philosophies and methods

All three of these projects come under the 'interpretivist' rubric. Interpretivists believe that the social world is interpreted or constructed by people and is therefore different from the physical world, which is often described in positivist ways. Interpretivists emphasise natural settings and seek to gain deep understanding of the meanings of the actors involved in the social phenomenon under study (Glesne, 1999; Sudweeks & Simoff, 1999; Williamson, 2002). In the three projects presented in this paper, participants were consulted in their own work environments, where attitudes were formed, and in the forums where their social behaviours were acted out. Other research philosophies might produce useful findings, but none are designed to bring together the diverse views of different people in various places so effectively.

Of the several paradigms which come under the interpretivist umbrella, we have mostly chosen constructivism. This paradigm assumes a relativist ontology (multiple realities), a subjectivist epistemology (investigator and respondent co-create understandings), and a naturalistic (in the natural world) set of methodological procedures (Denzin & Lincoln, 2000, p.21). The essence of constructivist belief is that there is no single objective reality 'out there'; instead there are multiple constructed realities about the phenomenon under study. An important role for us as researchers was to try to determine the scope of shared realities.

Berger and Luckmann's (1967) social construct theory emphasises the 'shared' nature of reality within particular societies and cultures. While in the constructed view there are events, persons, objects which are tangible entities, the meanings derived from them in order to make sense of, or organize, them are constructed realities (Lincoln & Guba, 1985, p 84). While having much in common with personal constructionists, social constructionists argue that meaning is developed through the interactions of social processes involving people, language and religion (Berger & Luckmann, 1967). Social constructionists see people as developing meanings for their activities together (Williamson, 2002, p.30), meanings that are 'shared' amongst people with common backgrounds. In other words, they recognise the impact of society, culture, and social environment on the way people behave and make meanings in a particular society (Berger &

Luckmann, 1967). Social behaviours are seen as indicative of distributed power relationships (Rothman & Tropman, 1987, p.10). In each of the case studies presented, the researchers interviewed users of systems who had common backgrounds, to elicit their shared understandings about the structures which they worked with, and about desired changes to the structures.

Ethnography, one of the methods favoured by constructionists, has also been used for our projects. One of the important aspects of ethnography is that it allows multiple interpretation of realities and alternative interpretations of data to be presented (Fetterman, 1989), which fits well with the purpose of constructivism. Modern ethnography, also referred to as participant observation, uses a range of techniques such as interviewing, focus groups, observation and questionnaires (Bow, 2002, p. 267). The techniques used for each specific project are discussed below but, in each case, the individual and/or focus group interview, was the key technique employed. As researchers we tried to work as partners in interpreting the participants' experiences and meanings.

Purposive sampling was used to select the sample for interview. Purposive samples, which are common in qualitative research, are premised on the concept of 'theoretical sampling', as discussed by Glaser and Strauss (1967). Theoretical sampling means selecting subjects which represent the major categories of people relevant to the research, e.g., mix of ages, genders, socio-economic background, education levels, types of investing, management roles, disciplinary allegiances. With this approach, there is no compunction to sample multiple cases which do not 'extend or modify emerging theory' (Pidgeon & Henwood, 1996).

Data consisted of the responses to structured interviews or focus groups. The gathering, coding and analysis of the qualitative data, for each of the projects, followed the grounded theory method. Analysis of data was a continuous process with the initial themes and categories, determined after the first few interviews, being continually reassessed and expanded as more data were collected. The full set of transcripts was read by all the researchers. In relying on interpretations from more than one researcher, we were seeking to acknowledge the role of constructionist researchers as the primary instruments in the research process (Marshall & Rossman, 1999) and to reflect on the effect of our own roles as they influenced the research process (Lincoln & Guba, 1985).

In addition to comparable philosophies, methods, and data, as described, there were other common features. In every project professionals of one sort or another were interviewed, be they managers of ticketing systems, investors, or systems designers. Also in each project, networked systems were an essential part of core infrastructure. Distributed access to databases was involved, and Internet gateways were the actual means, or the potential form of access for most.

There is a pattern to the explanation of the relevance of each project to the overall theme in the next part. The basic factual background of each project is described. The relationship of the intellectual content of each project to information management is laid out. The disciplines of the co-researchers and subjects are

enumerated. We describe the ways in which our theory and methods were applied. The strengths and weaknesses of the multidisciplinary alliances are noted.

International Olympic Committee (IOC) project

This 2001 project involved a multidisciplinary team. It is the largest project of the three described in this paper.

Following the successful Sydney Olympics, the IOC decided that steps should be taken to avoid the loss of knowledge which occurred each time an Olympic Games was completed. In fact, detailed recording of 'process' (called 'Transfer of Knowledge') began during the preparations for the Sydney Games. The IOC had no unified intranet, and internal intelligence was scattered across the organisation and in a range of formats. Standardisation was seen as a desirable objective. A reliable, consistent method for passing on know-how to forthcoming games was also required.

Questions remained about how to best optimise knowledge capture and retention, across the entire Olympic movement. The IOC was linked to an archive at the Olympic Museum, also in Lausanne. We relied on internal archivists to help us to understand the governance of the organisation, and to identify key managers for interview (IOC, 2000, p 83). The IOC was a rapidly-expanding organization at that time, and employed a plethora of energetic young professionals – dealing with contract law, media liaison, anti-doping medicine, accommodation, logistics, physical security, ticketing, sports specialisations, protocol, and other matters (IOC, 2000, pp 67, 68, 77, 97, 118).

Our involvement was with the analysis of user needs which underpinned the recommendations for future policy and practice. The key technique for undertaking the research was the individual interview. We worked with Monash librarians, another interviewer, and a systems analyst, and also examined relevant documents that gave us further insight into past practices. We met with the business partners (who put up the venture capital) often. There were ten Australians in the Monash team, and a librarian managed the project very effectively.

Sequencing of interviews to elicit cumulative data in an order to advance our understanding of the overall needs of the participants required careful planning. Overall the schedule proved effective. We began in Sydney, with preliminary interviews being conducted with five key Sydney Organising Committee Olympic Games (SOCOG) organisers during February 2001. Interviews ranged over the kinds of records of process kept during the lead-up to the Games, and views of how knowledge could be better captured and managed in the future. These interviews helped the development of the questions to be used in the next stage of the research which took place in Lausanne, at the headquarters of the IOC.

Our questions of 26 managers in Lausanne focussed, firstly, on the functions and activities of departments, needs for information, and the transfer of information and knowledge between departments, including how it could be improved, and, secondly, the knowledge transfer support services which could be developed (including the 'Transfer Of Knowledge' system begun in Sydney). The second phase included packaged information kits, workshops and seminars, provision of specialist information services, and the creation of a pool of recommended specialist advisers and consultants that Organising Committees Olympic Games (OCOGs) could deal with independently from the IOC.

Some members travelled to Athens, location of the 2004 Olympic Games, and Torino where the 2006 Winter Olympics are to take place. The purpose was to undertake preliminary interviews with the Athens Organising Committee (ATHOC) and the Torino Organising Committee (TOROC). A further visit was made to Salt Lake City, where the 2002 Winter Olympics were, at this stage, still in the future. In all, 29 ATHOC and 14 TOROC personnel were interviewed.

The results of the user needs analysis were summarised in a report. The two main recommendations were for a knowledge management system within the IOC, and an education program for the dissemination of know-how to future games personnel. Both were adopted. Some of the detailed results remain confidential, due to the commercial nature of the project. Nevertheless, from Monash's point of view, the project was highly successful in that a joint venture agreement worth about \$AUD8 million with the IOC (Toohey & Halbwirth, 2002, p. 19) was clear demonstration of the importance of being a leader in 'the field of knowledge management' and 'working with internationally recognised institutions' (IOC, 2001).

From a research perspective, a frustration for the authors of this paper was the inability to fully describe the entire project in public forums. Our relationships with two of Monash's business partners were governed by a complex set of interlocking contractual arrangements, and there was a tension between the strategic business objective and the need for traditional processes of disclosure and peer review of research. Managing relations required diplomacy, as might be expected. Our interactions with other professionals were very cordial, and contacts have been maintained since the project concluded. Insights were gained about the ideal sequencing of interview times, and co-ordinating debriefing, while the project was in progress. The teamwork required among the researchers to write up results as the interviews progressed, and relying heavily on e-mail for workflow, fostered a very trusting working relationship which has continued.

Information seeking by online investors

The next project involved fewer partners. It was a pilot study aimed to underpin an application for Australian Research Council (ARC) 'Discovery' funding, to undertake a wide-ranging project focusing on the role that information plays in the practices of people who invest online. The news that the ARC application had

been successful was learnt before this paper went to press. The pilot study, although small, revealed some interesting findings. It required full clearance by the Monash Ethics Committee (as did all the projects described in this paper).

The purpose was to understand information-seeking behaviour, with a view to gauging the need for regulation in the online investing environment. Despite the encouragement for individual investors to go online in the present era, there has been little research which examines how investors seek information in a non-advisory environment, nor the regulatory implications of this context where people make decisions mostly without consultation with an adviser, using 'direct execution' to make their investments. Until the advent of online investing, it was assumed that ordinary or retail investors act on professional financial advice. Financial regulators have generally dealt with the question by requiring the issue of warnings to investors to seek professional advice. But in the online investing context, where all the incentives are likely to cause investors to ignore such warnings, Kingsford Smith and Williamson (2004) believed it important to consider the information-seeking practices of investors more closely. There were at least two information management themes in this project: how contexts of information use change information-seeking behaviours; and the value which information users attach to informal, unofficial knowledge networks.

The bi-disciplinary alliance involved a professor of law and a researcher from the field of information and telecommunications in 2002. The study explored the ways in which online investors seek financial information, as well as information about the online investing process itself. The three major aims were to investigate:

1. The role of information, and its principal sources, in investors' decisions to invest online
2. The relationship of these findings to generic theory and empirical research in the field of information-seeking behaviour
3. Implications of these findings for regulation of online investing.

To meet the second aim, the 'information' researcher explored generic theory and empirical findings from the field of information-seeking behaviour, with emphasis on the community information field where considerable theory and empirical research findings have been generated. This field is sometimes labelled 'information seeking for everyday life'. Prominent in the study of community information-seeking behaviour have been the attempts to discover preferences for information sources.

Many of the earlier studies in the community information field (e.g., Chen & Hernon, 1982; Warner, Murray & Palmour, 1973; Lipsman, 1972) showed that people prefer personal sources of information. These studies – and more in Australia – tend not to be questioned in terms of their likely accuracy. Although not in the community information field, recent studies of Australian academics (Nimon, 2001; Mills, 2003) have shown that, even where information needs are more specialised, personal sources of information are still important. The limited research in the investment field (from a legal perspective) made a similar finding.

Shiller and Pound's (1989) survey revealed that initial interest in individual stocks was stimulated at least in part by inter-personal communications, not all of which was the result of broker contact.

An interesting question with regard to use of the Internet for everyday life information – apart from the level of use and the perceived value of the information available – is how the balance of sources used for everyday life information may have changed by the use of the Internet. Hector (2002) conducted a study, which included an extensive literature review and case studies of ten individual citizens, with data collected through interviews and diaries. A key finding was that the Internet was more often 'a complement or substitute for other sources' (p. 460), unless it was clearly the most convenient source. Participants saw the World Wide Web as the most convenient source for 'market information', which is a broad term which could include investment information, at least in its online form. Nevertheless:

it is not considered as a sufficient source as [users] often return to the search and use other sources before a decision is made and the problem solved (Hector, p.450).

This is confirmed by Williamson (1995; 1998) who found that people have different information source preferences and abilities to use specific information sources. There is a need for multiple sources of information to be widely available.

The purposive sample was selected to reflect a range of demographic characteristics (gender, age, employment, education and income). It included ten investors, who were either experienced in the online environment (five participants), or had an acquaintance with the issues involved, in five cases having tried out online investing (five participants). In addition, interviews were undertaken with representatives of two organizations that provide online investment services, E-Trade and COMMSEC, as well as the regulator, Australian Securities and Investments Commission.

One of the most interesting findings (Kingsford Smith & Williamson, 2004) was the degree to which the investors moved between the actual and virtual modes, not only for seeking information, but also for executing trades. Due to the novelty of the online mode, much attention has been devoted to it as if it were quite distinct from traditional investing. Kingsford Smith certainly believes that the case for a lighter regulatory touch has rested heavily on this view. In fact the researchers found several who identified themselves as online investors, and did in fact complete numerous transactions online, who also reported using traditional investing means. Sometimes they used the online mode for those shares in which they traded frequently, using the traditional advisory mode for parcels they intended to hold. All but one of the non-online investors was an active information seeker in the online mode, though they executed trades through a broker.

Findings with regard to the use of information sources were in keeping with those of the community information field, in general. Investors used a number of different avenues for collecting investment information: newspapers, tip sheets, TV and radio investing programs, as well as their broker. It was found that, with the advent of the Internet, a rich source of information has now been added for both online and non-online investors. Interestingly, even very experienced users of online information sources, such as an interviewee who is a day trader, still read the daily papers with particular care given to the financial pages, magazines and hard-copy financial newsletters. This points to the continued usefulness of print sources of information. It also bears out the findings of Hector's study of the use of the World Wide Web for 'market information.'

All participants talked with others who were also investors – ranging from family members, through flat-mates to friends and work colleagues. Nevertheless, some participants were quite clear that their trust was limited to one or two people whom they respected as knowledgeable. The researchers were not prepared to find the level of social inter-communication in investment information seeking that they encountered from the first interview, despite the fact that very few interviewees reported using chat rooms or bulletin boards. The social inter-communication ranged from structured casual conversations, to regular semi-formal meetings in pubs and coffee shops, to more formal discussion groups with a common interest in investing, and on to investor clubs in which members contributed to a common fund to learn from making actual investments. At the most structured, there are associations such as the Australian Shareholders Association which conducts regular meetings with a formal agenda but has an opportunity for socialising afterwards, and the Securities Institute of Australia which has a formal program of securities industry education and training. The Australian Stock Exchange also conducts seminars on issues of current interest to investors, which some of investors reported attending. Indeed, it became clear that many investors see investing as a leisure activity. Several investors made an analogy with gambling which led the researchers to conclude that:

there is further justification here for regulatory action that takes online investor education very seriously. If the attitude that online investing is a leisure activity, or even as a form of gambling is prevalent, it means that it will be insufficient to educate investors about the factual aspects of online investing. (Kingsford Smith & Williamson, 2004).

Online learning repository

The third project also led to a finding of gaps in the law. This project required the evaluation in 2003 of a repository of teaching resources on the World Wide Web, created jointly over two years by three universities (Monash, Queensland, Sydney) to help academics to teach software, network, and application developers. Building the Internet Workforce was supported by the Australian Computer Society, the Australian Information Industries Association, Compuware, a major supplier of enterprise software, Sun Microsystems, the

federal Department of Education, Science and Technology (DEST), and three state governments.

Three key objectives of the original project were to:

1. Design and develop a set of teaching resources (named 'learning objects') for a curriculum in Internet and network computing. These are intended for a variety of contexts and learning styles. They are not complete subjects or courses, but smaller units which can be put together in a flexible way
2. Support innovative approaches to teaching for both on-campus and flexible delivery of material. All teaching materials are available over the World Wide Web
3. Evaluate to ensure that the results of the project are useful to the widest possible audience (Bell & Schauder, 2003).

Our evaluation project aimed to test the learning outcomes from the use of resources, the impact on staff in terms of both the development requirements for such resources, as well as any change to teaching methods, and the impact on the learner-teacher relationship. Our research was intended to provide independent advice to DEST.

Systems designers had completed a fully-functioning prototype for us to assess. Many learning objects were uploaded to the repository by academics from all participating universities. Curriculum designers had provided advice on the structure of the database. The system incorporated cataloguing facilities to provide order and consistency, quality assurance of learning materials, and retrieval facilities which supported quick access to reusable learning resources. Some information management features of this research project include an assessment of how well organised the learning resources are within the repository, how searchable they are by academic users, and whether the interface is easy to navigate.

Twenty-seven academics were interviewed, nine from each university. In practical terms, arranging these interview numbers and times required much logistical patience. An experienced systems consultant wrote a report which evaluated the technical design of the repository. We also interviewed him. He assured us that the numerous suggestions by interviewees could be accommodated within the existing set-up, without structural rearrangement of the underlying database or its supporting characteristics. With this advice from a related discipline we were encouraged to make wide-ranging recommendations. Our findings engaged with a range of disciplinary interests, from curriculum planning, to university management, database design, and copyright law.

Limited space permits only a limited summary of project findings. The advantages of the repository for curriculum development were fairly obvious, viz., the sensible approach of sharing and reusing teaching materials; the building of a sense of collegial teaching community; the source of ideas and inspiration provided by the repository; the potential time-saving contribution, which has great

appeal to busy academics; and the potential for the repository to provide materials that are quality assured. Most interviewees were using the World Wide Web as an alternative source for teaching materials, with varying degrees of enthusiasm. Some saw it as completely adequate, thereby posing a threat to the very *raison d'être* of the repository itself. The consensus amongst all participants was that the repository has benefits for new and experienced academics, especially when the latter are required to present new units often.

We asked about whether university culture promotes co-operation or competition in relation to teaching, and the intended role of the repository as promoting co-operation. This topic sharply divided interviewees in extreme ways, not seen with other topics. They held strong views which were diametrically opposed, some independent thinkers stressing the special value of originality in content and delivery, others favouring teamwork and recycled resources (the tried and the true). University managers and planners could well take the strength of these opposing views to heart. A major resourcing concern was identified as a need for systematic quality control of the content of the repository. It was agreed that only good resources should be deposited, they should be evaluated by peers (who should be paid?), and regular rewards must be assigned to staff who make conscientious efforts to keep content up-to-date.

Interviewees generally agreed that the repository interface was navigable without great difficulty, and that it was designed to fulfil its aims, viz., to assist academic teachers to upload and to find learning objects for shared further use. Overall, numerous constructive suggestions for change were made, to encourage improved navigability. One important issue raised about usability was a lack of ability to trace, record and recall a search history. This tracking of strategy for an academic user is important at every turn, in relation to moving into the database, moving around it, and out of it also.

A number of copyright issues surfaced in the interviews, expressed in terms that would be quite familiar to librarians who are au fait with virtual libraries. Well-intentioned academics who create and load content to the repository, were keen that all materials retain copyright integrity, ensuring that authors are acknowledged. There was a large degree of uncertainty about how copyrighted materials might be used by other academics, and how repository guidelines might be monitored and enforced. Where references or quotations from published material, or other people's work, are integral to the object, how would the repository manager ensure that these are fully acknowledged at every use? If video of a live lecture is captured into the repository as part of a multimedia file, then who owns which bit of it? Legal solace to these nagging anxieties is not to be found in the Copyright Amendment (Digital Agenda) Act of 2000 (Australian Department of Communications, Information and Technology and the Arts, 2004) unfortunately, let alone within the repository design itself. In keeping with the tradition of hypothesising about further investigation, it is worth speculating as to whether any automated rights management system could cope with the complexities raised by this project evaluation.

Conclusion

The unified philosophies and methods adopted in the three projects described in this paper allowed the researchers to work closely with co-researchers, subjects, and data from several other disciplines, without compromising the integrity of the process or findings. User needs analysis provided the modus operandi; goodwill provided constructive co-operation amongst the participants. No threat was posed to information management in any shape or form.

An enriched research experience was reciprocal. The multidisciplinary approach aided in scoping the projects realistically, at the start and in progress, and in eliciting sufficient funding to ensure thorough investigations. In order to nurture relationships it is necessary to accept that a good deal of time must be devoted to an ongoing search for common ground – in careful conceptualisation, acceptable work habits, smooth project implementation, and the means and channels for publication of findings. Other disciplines helped to provide us with extra knowledge, additional intellectual tools, deeper understandings of the framing of the research problems, and broader applications of our findings. Networks have been established which continue to ensure fresh insights and new project alliances.

Competent project management was essential in all of the research, but this was essential regardless of the multidisciplinary nature of the work. The power of e-mail (mentioned only briefly) as a necessary force for co-ordinating communication in these projects might well form the subject of another paper.

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DISCUSSION

[*G Johanson*] Social computing is incorporated within the aims of the Faculty, and attempts to humanise IT. Interpersonal information flow is significant. We look at activities where this interaction needs to be recognised, for example e-business.

[*G Johanson*] If you are working with others in a multidisciplinary project there are advantages including: it is a rewarding way to work; projects too big for one discipline or one researcher can be undertaken; there is variety of focus to the research; and there is interpersonal communication with researchers. Multi-disciplinarity can be challenging, but work is not necessarily published in only one discipline; it brings together several areas of funding; it may broaden discoveries in a way single focus research cannot. Developing a good understanding of each others' ways, and e-mail and good project management are essential

[*M. Seefried*] Special libraries such as the Queensland Parliamentary Library face the same decisions as academic libraries as far as 'future proofing' collection development is concerned, e.g. print vs. electronic. They have the additional responsibility of archiving, which brings issues of copyright, licensing, and security. Multi-skilling remains a staffing challenge. Collaboration and partnerships – government shared resources program – libraries share information with other government departments. This has affected collection development with consortia formed to develop e-serials collections.

Buckland's challenges identified earlier are very real for the parliamentary libraries.

Parliamentary libraries in Australia provide research a service with multidisciplinary teams. Clients have a diverse range of needs. Staffing is a problem – librarians or researchers? The Queensland solution was to use eight staff in reference interview-type written response cases, and research analysts to form well-structured responses. These people work together. Questions may be deconstructed and answered by different members of the team. This encourages staff to stay current through continuing professional development.

The Australian Parliamentary Library has 100 staff. They use librarians and researchers. They carry out user needs analysis using natural setting, user queries analysis every three years. All queries are indexed. They carry out annual user evaluation and direct dial clients for feedback. Results are published and recommendations made.

[*G Johanson*] (responding to question on research as generation of new knowledge) New knowledge doesn't have to be a publication; it could be consultancy solving real-world problems. Universities define research narrowly,

but there is usually acknowledged to be a difference between basic research and applied research.

New knowledge consultancy and new knowledge are not incompatible. There may be a problem of context – can university departments drop other commitments to undertake research? Can teaching staff buy out of teaching using research funding?

[*K Smith*] There are ways forward improve the nexus between practitioner and researcher, e.g. Annemaree Lloyd's research with firefighters. Our own practitioners may not read the literature – there is a need to get our literature into repositories. There is also the idea of methodologies for hire – being thrust into collaborations with industry to solve industry problems.

