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Research

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Introduction

This chapter provides an overview of the research in librarianship and information science (hereafter LIS) carried out in the UK in the period 2006-10. More specifically, we discuss academic research as (predominantly) published in the peer-reviewed journal literature, complementing and extending the chapters by Nicolas in the volumes of *British Librarianship and Information Work* for the periods 1991-2000 and 2001-2005.[i] We consider first the current funding environment for LIS research, and then the outcome of the most recent Research Assessment Exercise in 2008 (RAE2008). The next, and largest, section discusses the range of LIS research being conducted in the UK as reflected in a range of types of publications, specifically those indexed in the *Web of Science*, those published in a series of special issues of the journal *Aslib Proceedings*, and those published in 2006 and 2007 that were included in submissions for RAE2008. The chapter closes with brief discussions of staffing changes in LIS departments and of the creation of the Library and Information Science Research Colloquium.

The funding environment

Governmental funding for academic research in the UK comes from two major sources. The first of these sources, and arguably the more prestigious given its increasing scarcity, is financial support for specific research projects awarded after competitive peer review by funding agencies, such as the seven major research councils comprising Research Councils UK. The second source is the QR (for quality-related) funding provided by the funding councils on the basis of departmental performance in the RAE (*vide infra*). These provide the two components of the 'dual support' system that funds the bulk of UK academic research.[ii]

For many years, the British Library Research and Development Department (BLRDD) acted as a research council targeted specifically at the LIS community, providing a generous level of support across the full range of the discipline and playing a key role in developing the research capacities of many LIS departments. However, BLRDD's responsibilities were transferred to, in succession, the Library and Information Commission, Re:source: the Council for Museums, Archives and Libraries, and finally the Museums, Libraries and Archives Council (MLA). These transfers were accompanied by drastic changes in both the scale and the nature of the funding, with a focus on short-term consultancy projects rather

than on long-term academic research. The current Government announced the abolition of the MLA in June 2010, with its responsibilities transferred to the Arts Council and the National Archives in October 2011. With MLA's demise, the most obvious UK source of funding for LIS research is now the Arts and Humanities Research Council (AHRC) (though it should be noted that research in specialist areas of information science, e.g., in geographic

Recipient (University)	**Project title**	**Award (Year)**
Julie McLeod (Northumbria)	Accelerating positive change in electronic records. Understanding issues and developing practical approaches.	£318K (2006)
Nigel Ford (Sheffield)	Developing effective Web-based information seeking for inquiry-based learning: a meta-cognitive approach	£318K (2007)
Andrew Flinn (UCL)	Community archives and identities: documenting and sustaining community heritage	£166K (2007)
Charles Oppenheim (Loughborough)	Using the h index to rank influential UK researchers in information science and librarianship	£67K (2007)
Elizabeth Shepherd (UCL)	The impact of the UK Freedom of Information Act on records management in the public sector	£93K (2007)
Ian Ruthven (Strathclyde)	Decision making in Web searching: what do searchers look at and why?	£146K (2008)
Nigel Ford (Sheffield)	Developing deep critical information behaviour	£216K (2010)

Table 1. AHRC standard research-grant awards 2006-10.

information systems or chemoinformatics, may be able to attract support from other of the research councils). When the AHRC was established in April 2005, it set up a series of specialist panels to review grant applications in specific areas, with one of these focussing on LIS, galleries and museums. However, the AHRC has now abolished its panel structure and there is thus no group with specific responsibility for LIS research; instead, applications in this area have to compete with applications from the full range of disciplines in the arts and humanities, making successful applications even more rare than was previously the case.

In the period 2006-2010, the AHRC made just seven awards for LIS research under their standard research-grant scheme [iii] as detailed in Table 1, these awards representing a total of *ca*. £1.3M. There have been awards to LIS researchers on other schemes, e.g., Jonathan Foster (Sheffield) was awarded £96K for a project entitled "Riders Have Spoken: Designing and Evaluating an Archive for Replaying Interactive Performances" in 2009 as part of AHRC's Beyond Text programme, and Alastair Black (Leeds Metropolitan) was awarded £23K in 2007 for research leave to facilitate writing the book *Books, Buildings and Social Engineering. Early Public Libraries in Britain from Past to Present.* Even so, the figures compare most unfavourably with the £1.4M annual spend by the BLRDD in the mid-1980s and the £1.6M annual spend in 1995 when it closed (by which time the effects of inflation were already much in evidence).[iv]

Given the limited research council funding, LIS departments have had to look elsewhere. Non-governmental public-sector funding can come from local councils, charities, and the NHS *inter alia*, all of which can provide a useful source of support for research that is of direct relevance to their respective missions. This is also the case for private-sector funding where science-based companies, in particular, can support leading-edge academic research that is often carried out in close collaboration with their own internal research groups. Research-student tuition fees (which can be considerable for some overseas students) provide another, albeit rather different, way of supporting research, and there may be other sources that are of importance in some circumstances, e.g., an institution may provide seed-corn support to a department with the expectation that this will subsequently result in external funding.

Brophy summarizes some of the funding sources that were being tapped by the LIS sector in late 2006.[v] He notes in particular the opportunities offered by the many European Union (EU) funding schemes, and these opportunities are clearly being grasped. For example, the submissions to the last RAE (*vide infra*) show that the EU formed the largest single source of funding for the period 2002-2008 for at least three of the LIS departments (those at Leeds Metropolitan, Manchester Metropolitan and Sheffield), and figured prominently in the funding sources of the other departments. This situation is likely to continue for quite some time given the severe financial pressures that UK-based funding agencies are now experiencing.

The Research Assessment Exercise (RAE2008)

An extremely important feature of academic research is the regular RAE,[vi] which is organized by the funding councils and which involves a detailed peer review of the research carried out by university departments throughout the UK higher education sector. These evaluation exercises have now been running since 1986, with that reporting in December 2008 being the sixth; the next, which will be called the Research Excellence Framework (or REF), will report in 2014. The peer review of all the departments working within a specific discipline is carried out by a small panel of experts. Each department in 2008 submitted for review to this panel a list of research publications by each of its members of staff, and two textual statements: one providing evidence of the esteem in which its research was held by the community; and the other describing its research environment (covering factors such as staff development, research strategy, and future plans).

A total of 21 departments submitted to the RAE2008 panel for 'Library and Information Management' (its formal title). Previous RAEs graded each submitting department on a simple ordinal scale containing between four and seven points. RAE2008 used a five-point scale (unclassified and grades 1-4); however, rather than a single overall grade, each department received a profile indicating the percentage of their overall submission receiving each of the five grades. This profile represented the weighted total of individual profiles describing the publication, research environment and esteem components of a submission. The results are listed in Table 2, which contains not only the overall profiles but also a

weighted mean grade that was used by the media to publish 'league tables' for each discipline. Using the weighted mean grade criterion, Sheffield came top of the rankings, as in the previous RAEs, closely followed by no less than five other institutions; other criteria give slightly different rankings, e.g., Kings College had the largest percentage of grade-4 research (35% as against 30% for Sheffield and for UCL).[vii]

Institution	Profile	Weighted mean
University of Brighton	10/30/35/20/5	2.20
Brunel University	20/30/35/15/0	2.55
City University	15/50/30/5/0	2.75
Coventry University	5/35/45/10/5	2.25
Kings College London	35/30/15/15/5	2.75
Leeds Metropolitan University	10/35/45/10/0	2.45
Liverpool John Moores University	5/20/30/45/0	1.85
London South Bank University	0/15/30/45/10	1.50
Loughborough University	15/40/30/10/5	2.50
Manchester Metropolitan University	0/20/45/35/0	1.85
University of Salford	25/20/30/20/5	2.40
University of Sheffield	30/35/25/10/0	2.85
Sheffield Hallam University	5/20/35/40/0	1.90
Staffordshire University	0/25/35/35/5	1.80
University College London	30/25/35/10/0	2.75
University of Wolverhampton	25/40/20/15/0	2.75
University of Glasgow	25/30/35/10/0	2.70
Napier University	10/50/25/10/5	2.50
Robert Gordon University	15/45/40/0/0	2.75
University of the West of Scotland	0/20/40/25/15	1.65
University of Wales, Aberystwyth	10/40/35/15/0	2.45

Table 2. Gradings of library and information management departments in RAE2008.

Inspection of Table 2 reveals that many of the departments submitting to the Library and Information Management panel would not normally be considered as carrying out research in LIS. These non-traditional submissions were dominated by departments with a strong information systems focus, reflecting a trend that began with the submissions for RAE1996; there were also two submissions focusing on humanities computing. It will also be seen that several traditional LIS departments are not represented; e.g., the newly merged Computer and Information Sciences department at the University of Strathclyde submitted to the computer science panel.

The panels in previous RAEs had been quite critical of some of the LIS research submitted for review but the RAE2008 panel report noted 'significant advances in the systematic and professional approach to research management across the discipline as a whole' and stated that 'there is a significant body of work being published which is comparable to the best work in its field or subfield at an international level, and is making a significant and substantial

contribution to the development of the discipline and the professions to which it relates'.[viii] This successful outcome for the sector in RAE2008 should provide a firm basis for departments' planning for the REF in 2014. This will differ from all previous RAEs in that a significant part of the assessment will relate to the non-academic impact of research, where

Journal	Articles	5-year impact factor	Fraction of UK articles
Aslib Proceedings	112	0.72	0.61
Health Information and Libraries Journal	94	0.94	0.54
Journal of the American Society for Information Science and Technology	94	2.11	0.11
International Journal of Information Management	72	1.78	0.32
Journal of Documentation	67	1.41	0.35
Scientometrics	63	2.42	0.08
European Journal of Information Systems	52	1.77	0.24
Program	52	0.52	0.39
Journal of Librarianship and Information Science	51	0.54	0.60
Information Processing & Management	50	1.79	0.12

Table 3. The most popular journals for UK LIS research based on WoS data for 2006-10.

WoS subject category	Publications
Computer Science, Information Systems	911
Management	264
Computer Science, Theory & Methods	169
Computer Science, Interdisciplinary Applications	117
Social Issues	112
Business	95
Education & Educational Research	84
Communication	63
Computer Science, Artificial Intelligence	44
Engineering, Electrical & Electronic	37

Table 4. Additional WoS subject categories assigned to 1782 LIS publications in the category 'Information Science & Library Science' during 2006-10.

impact is defined as 'an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life'.[ix] It is to be expected that the sector should perform well in the REF given the real-world focus of much LIS research.

Analysis of publications

An obvious way to obtain an overview of the UK LIS research landscape is to look at the publications of the current generation of researchers to identify their areas of interest. Three different sources were used: data available from the Thomson-Reuters *Web of Science* (WoS)

Author	Publications
Michael Thelwall	68
David Nicolas	44
Hamid Jamali	33
Paul Huntington	27
Charles Oppenheim	24
Ian Rowlands	21
Quentin Burrell	13
Christine Urquhart	13
Martin Meyer	12
David Bawden	11
George Buchanan	11
Jennifer Rowley	11
David Stuart	11
Andrew Booth	10
Forbes Gibb	10
Kayvan Kousha	10
Andrew Macfarlane	10

Table 5. The most productive UK LIS authors based on WoS data for 2006/10.

database; issues of the journal *Aslib Proceedings* that were given over to the research of individual LIS departments; and departmental submissions to RAE2008.[x]

Web of Science

A WoS search was carried out for items in the subject category Information Science & Library Science that had been published in the period 2006-10 by UK authors. This search identified a total of 1782 such publications after the exclusion of editorial material, book reviews, corrections etc.

The ten most popular journals for LIS academics to publish in are listed in Table 3; other popular journals just outside of the top ten positions include *Journal of Information Science*, *Interlending and Document Supply*, *Learned Publishing*, and the *International Journal for Geographical Information Science*. It will be seen that the table contains at least one journal – the *European Journal of Information Systems* – that is clearly in the area of information systems, rather than LIS. This reflects the range of journals included in the chosen WoS category; while many of these journals are obviously LIS-focused, the category also contains several journals that have a more obvious computer science focus. The table also shows the 5-year impact factor for the journal, taken from the Social Sciences part of the *Journal Citation Reports* database, and the fraction of articles appearing in a journal in the period

2006-10 with UK authors. It is arguably disappointing, although perhaps hardly surprising, that the percentage of UK contributions is highest in the publications with the lowest impact factors. The set of 1782 LIS publications was assigned a total of 40 different WoS subject categories, covering topics as diverse as Art, Ergonomics, Fisheries, and Imaging Science Photographic Technology, and with the ten most frequently assigned categories listed in Table 4. These categories are not unexpected, focussing on computing and management, but they illustrate clearly the range of disciplines to which LIS exports knowledge and research.[xi]

The most prolific authors, as denoted by those with a minimum of ten publications from 2006 to 2010, are listed in Table 5. The leading author is Mike Thelwall from the University of Wolverhampton, who published no less than 68 articles in the period under review, these covering a wide range of topics in webometrics (i.e., bibliometric studies of the World-Wide Web). Thelwall apart, the table is dominated by members of the Centre for Information Behaviour and the Evaluation of Research (CIBER) at UCL (Paul Huntington, Hamid Jamali, David Nicolas and Ian Rowlands). The CIBER group studies the ways that people behave and consume in the digital environment; as the members of the group publish extensively together that there is some degree of overlap in the counts in Table 5. Of those in the top five positions in Table 5, all but Hamid Jamali also occurred in the top five positions in Nicholas's corresponding list for 2001-05 UK LIS research.[i]

It should be noted that the use of the WoS LIS category is slightly misleading, since it is not applied to all of the areas in which LIS staff work and publish. For example, one of the UK's other leading research groups (Val Gillet, John Holliday and Peter Willett, who work on chemoinformatics at Sheffield) had 66 articles in WoS for 2006-2010; however, only 12 of these were allocated to the LIS category, with the others appearing in chemical journals such as the *Journal of Chemical Information and Modeling*). Again, while WoS now covers conference proceedings, the LIS category does not include the most important information retrieval (IR) conferences: these are the annual ACM SIGIR conference on *Research and Development in Information Retrieval*, and the European conferences in *Information Retrieval Research*, the proceedings of which included over 100 articles published by UK authors during 2006-10.

The reader may obtain a final, and rather different view (although stretching back far beyond 2006) as to the country's leading researchers reported in the work of Oppenheim and Sanderson and colleagues.[xii] These authors have computed citation-based scores for UK LIS researchers and then compared these with human judgements of research reputation, the latter study including leading researchers from not just the UK but more generally.

Aslib Proceedings special issues

Starting in 2006, *Aslib Proceedings* has published several special issues (or double issues in some cases) that are given over to publications by the members of an individual LIS department. Thus far, these issues have covered in turn the departments at University College London, the University of Aberystwyth, London Metropolitan University, City University, Thames Valley University (now the University of West London), Manchester

Metropolitan University, and the University of the West of England (as detailed in Table 6). Inspection of these special issues provides a good overview of the range of LIS research that is being conducted. For completeness, we have also included in Table 6 the most recent

Publication details	LIS department	Articles	Categorisation
2006 Vol 58 Issue 1/2 Double Issue	School of Library, Archive and Information Studies (now Department of Information Studies), University College London	11	1 Viewpoint; 2 General reviews; 1 Literature review; 1 Conceptual paper; 1 Case study; 5 Research papers
2006 Vol 58 Issue 6	Department of Information Studies, University of Aberystwyth	9	2 General reviews; 7 Research papers
2007 Vol 59 Issue 2	School of Information Management, London Metropolitan University	6	1 Uncategorised *; 1 Viewpoint; 1 General Review; 2 Conceptual Papers; 1 Case Study
2007 Vol 59 Issue 4/5 Double Issue	Department of Information Science, City University, London	13	1 Uncategorised *; 1 Viewpoint; 5 Conceptual Papers; 1 Case Study; 5 Research Papers
2008 Vol 60 Issue 6	School of Computing and Faculty of Business, Thames Valley University	9	4 Conceptual Papers; 5 Research Papers
2010 Vol 62 Issue 1	Department of Information and Communications, Manchester Metropolitan University	7	1 General Review; 1 Literature Review; 5 Research Papers
2010 Vol 62 Issue 6	Library Service and Faculty of Environment and Technology, University of West of England	6	1 Viewpoint; 2 Case Studies; 1 Technical Paper; 2 Research Papers
2011 Vol 63 Issue 2/3 Double Issue	Information School, University of Sheffield	11	1 General Review; 2 Case Studies; 8 Research Papers

Table 6. Research outputs from UK LIS departments published in *Aslib Proceedings* special issues. *Uncategorised articles were introductions to issues

special issue, that for the University of Sheffield, which appeared in mid-2011 shortly after the end of the time-span for the present review.

In all, 72 papers (excluding editorials) were published covering a broad range of topics. The abstracts of these papers were downloaded for examination, and full papers accessed when necessary for clarification. The journal accepts contributions across a number of categories,

and Table 6 shows that LIS departments are publishing across these categories: in all there were 2 Uncategorised, 2 Literature Reviews, 4 Viewpoints, 6 General Reviews, 7 Case Studies, 12 Conceptual Papers, 1 Technical Paper, and 38 Research Papers. The presence of only a single Technical Paper would seem to be misleading as nine of those papers classed as

Figure 1. Tag-cloud of key research areas based on *Aslib Proceedings* special issues.

Research Paper were technical in subject content, as were a selection of those classed as Conceptual Paper or General Review.

We can gain a better idea of the breadth, scope and focus of the published output by an evaluation of the 295 keywords assigned to the papers. The keywords show that departments are engaged in information research ranging from traditional library topics (such as classification and archives) to emerging areas (such as mobile communication systems, video gaming, and artificial intelligence). The distribution of keyword frequencies is, as one would expect, very skewed with 248 of them occurring only once in the special issues. These singleton keywords cover not only obviously LIS-related topics but also topics as diverse as aerospace engineering, copyright law, change management, entrepreneurialism, epistemology, food products, gender, image processing, jet engines, Malawi, marine transport, parallel programming measures, secondary education, Somalia, video games and workplace learning *inter alia*.

Forming a tag-cloud from the keywords based on frequencies is an effective way to illustrate the main areas of research, which is predominantly UK-based but with some international studies. The tag-cloud in Figure 1 was generated using Tagcrowd (available at http://tagcrowd.com/) and shows that the most important topics are communication technologies, information management, information science, knowledge management, and the World-wide Web. There is also a cluster of keywords around the domain of education:

education, information literacy, learning, professional education, school libraries, research, and universities. Archives-management, information retrieval, and libraries also appear but are not dominant.

Table 7 compares the top subjects from the *Aslib Proceedings* special issues with those identified by Nicholas (using data drawn from the *Social Sciences Citation Index*) in his two previous reviews of UK LIS research.[i] It will be seen that some traditional topics such as inter-lending, document supply and copyright no longer appear, whilst knowledge management, and communications technologies enter the list together with a raft of topics around education and learning. Libraries and information retrieval are the only two topics that appear in all three lists.

Although many of the studies are UK based, there is evidence of a wider global reach with research carried out across Europe and further afield in Africa, America, Asia and the Middle East. Just over a third of the papers show collaborative research: working with other departments within a university such as computer studies departments; working with other colleges and universities in the UK and internationally; working with other external organizations, for example the NHS, small businesses, charities, and key information institutions such as the National Archives, the British Library, and Microsoft Research Ltd. Such collaborations show that LIS research is not purely 'ivory tower' and academically driven but has a more dynamic aspect with local and global reach making a difference in communities. As Feather [xiii] comments in his review of LIS research in the UK, 'Cross- and inter-disciplinary research…is flourishing…', giving potential for knowledge transfer and transition from research into practice.

We have noted previously the importance of research funding, but there is little evidence or acknowledgement of funding sources in the *Aslib Proceedings* papers. Two examples where this does occur are Cawley and Hynes [xiv] receiving support from the Research Advisory Panel of Dublin City University for their study on mobile communication, and Robinson and Glosiene [xv] receiving support from the Open Society Institute. Sheffield researchers appear more successful at securing sources of external funding, with studies here [xvi] including Petrelli *et al*. being supported by the Department of Trade and Industry and Rolls Royce plc, Beverley *et al*. by the AHRC, and Bakri and Willett by the Government of Malaysia for work on interface design, health information and bibliometrics, respectively. There may, of course, be other cases where the funding source is not stated.

There is considerable interest in research methods for LIS.[xvii] The research here involved a few quantitative studies but with an emphasis on mixed methods and qualitative studies: the methods used reflected the breadth of topics and interests, with interviews, questionnaires and critical literature review being mentioned quite frequently as the methods of choice. Other methods and techniques listed were longitudinal action research, usability testing, case study, content analysis, desk-based research, framework analysis, focus groups, web analysis, semantic web techniques, theory development, grounded theory, citation analysis, repertory grid technique, historical analysis and historiography, phenomenography, narrative,

institutional profiling, diagnostic measures, parallel computing measures, statistical analysis, laboratory-based research, and evaluation. This list shows a great diversity of approaches, possibly benefiting from increased interaction with other disciplines and domains, resulting in an application to LIS research problems of research methods traditionally used elsewhere.

Rank	1991-2000	Rank	2001-2005	Rank	2006-10
1	Document supply	1	Internet	1	United Kingdom
2	Electronic publishing	2	United Kingdom	2=	Information management
3	Information technology	3	Information retrieval	2=	Information science
4	Internet	4	Libraries	4=	Knowledge management
5	Inter-lending	5	Information systems	4=	World-wide web
6	Libraries	6	Information	6	Information literacy
7	Information systems	7=	Academic libraries	7=	Communication technologies
8	Information retrieval	7=	Information management	7=	Records management
9	Copyright	9	User studies	7=	Research
10	Information services	10=	Document delivery	7=	Wales
11	Journal publishing	10=	Inter-lending	11 =	Information retrieval
12	Library services	12=	Digital libraries	11=	Education
		12=	Information technology	11=	History
		12=	Research	11=	Libraries
		12=	World-wide Web	11=	Information profession
				11=	Learning
				11=	Professional education
				11=	Universities

Table 7. Keywords or subject descriptors identified in *Aslib Proceedings* special issues compared with previous analyses of UK LIS work by David Nicholas. [i]

The diversity of the LIS departments is reflected in this brief analysis with each department having its own strengths and specialisms and making research contributions locally through community contacts, nationally with Government institutions, and internationally through links with international businesses and academic institutions in other countries. The domain is benefiting from these expanding research networks, which bring increased scope and opportunities to develop and to apply a broad range of research approaches.

RAE submissions

In RAE2008 each member of academic staff put forward for review had to submit (normally) four publications from the period 2001-07 that best illustrated their research achievement. These submissions hence provide a unique overview of what the sector believes to be the highest quality publications in the discipline. We have chosen to focus on the submissions

Type of research output	Count
Journal article	162
Chapter in a book	25
Conference contribution	17
Book	12
Internet publication	12
Software	1
Research report for an external body	1

Table 8. Output types for 230 RAE outputs published in 2006-07.

Journal	Articles
Journal of Documentation	19
Aslib Proceedings	15
Journal of the American Society for Information Science and Technology	10
Journal of Librarianship and Information Science	8
Information Research	6
Journal of Information Science	5
Health Information and Libraries Journal	4
Library Management	3
Program	3
Library History	3

Table 9. The most popular journals for publishing UK LIS research based on RAE outputs published in 2006-07.

from the eleven departments in Table 2 that ran Chartered Institute of Library and Information Professionals accredited courses at the time. These departments were those at the University of Brighton, City University, Leeds Metropolitan University, Liverpool John Moores University, Loughborough University, Manchester Metropolitan University, the University of Sheffield, University College London, Robert Gordon University, the University of Glasgow, and Aberystwyth University. We examined the research outputs published during 2006-07 from 125 permanent members of the staff from these departments, excluding those items that had been published in the special issues of *Aslib Proceedings* that have been analysed above. This gave a total of 230 research outputs; these were categorised in the RAE as listed in Table 8, where it will be seen that the journal article was the output-type of choice for the great majority of the researchers.

LIS researchers are active at a number of high profile conferences such as those sponsored by the Association for Computing Machinery and the Institute of Electrical and Electronics

Engineers. Conference contributions focus mainly on technical topics, such as digital libraries, e-Government, information retrieval, knowledge management, virtual realities and visualisation. In addition there was one example of software development; this was the LandSerf Geographic Information System, which was designed by Jo Wood at the Department of Information Science at City University for the visualisation and analysis of terrains and landscapes.[xviii]

Thirty seven research contributions were published in book form, either book chapters in edited collected works or authored monographs. The most popular publisher was Ashgate, followed by Facet, Springer, and Idea Group Inc. The subject coverage in this media format was more varied than that of the conference contributions, which focused on technical topics. In the book contributions, the most frequently covered topics were history, information technologies and libraries, with e-commerce, information management, networked communities, preservation, publishing, record keeping, and research also represented. Within the list of book titles we see key texts for LIS students and practitioners such as Peter Brophy's (Manchester Metropolitan University) *Measuring Library Performance: Principles and Practice* and *The Library in the Twenty-First century*, both published by Facet, Helen Forde's (University College London) *Preserving Archives*, also from Facet, and Anne Goulding's (Loughborough University) *Public Libraries in the 21st Century* from Ashgate.[xix] These titles are exemplars of research impacting on teaching and practice.

There is little evidence of research impacting on policy during the period under study, with only a single contribution being a research report for an external body. This was a report by Sarah Horton and Jacqueline Spence (Aberystwyth University) that was written for the MLA Council Yorkshire and that scoped the economic and social impact of archives.[xx] As noted previously, MLA's responsibilities have now been transferred to the Arts Council England, which may diminish the impact of such reports since the Arts Council will have its own priorities. The lack of research reports by academics should be considered against a background of consultancy organizations that compete vigorously to provide such reporting services.

A review of the journal outputs revealed the breadth of journals in which researchers chose to publish, with the 162 articles appearing in no less than 100 different journal titles. The titles most popular with researchers are shown in Table 9, where the count for *Aslib Proceedings* is after excluding the articles from the special issues of this journal that have been discussed in the previous section, and where the count for *Information Research* includes papers described in the RAE as either 'Journal article' or 'Internet publication'. All but two of the journals in the table appeared in the top ten positions in Nicholas's 2001-05 list of popular journal destinations for UK LIS authors,[i] with *Library Management* and *Library History* replacing the *International Journal of Information Management* and *Interlending & Document Supply* in the earlier list.

These top journals reflect the core of LIS research. That said the scope of the work is very broad with articles being published in journals covering a range of subjects and disciplines

including academic libraries, archives, business, communications, computer science, data management, digital curation, education, electronic environments, geographic information, health information, information, information systems, intelligence, knowledge management,

Figure 2. Tag-cloud of keywords extracted from journal articles and Internet publications based on RAE2008 outputs published in 2006-2007

library history, literature, multimedia, networking, performance measurement, public administration, publishing, reference services, research, society, security, and much more.

A keyword analysis was carried out on the 162 journal articles, and the 12 Internet publications. Where keywords were not available they were generated from concepts contained within the title and abstract. A total of 605 keywords and phrases were extracted, of which 367 occurred just once and 204 occurred just twice. The remaining 34 keywords were described by a tag-cloud, again using Tagcrowd. The resulting visualisation in Figure 2 shows the most frequently used keywords across the body of research outputs. Information retrieval (14) is the most frequent keyword followed by United Kingdom (11), with other appearances including archives (8), Internet (7) information literacy (7) and higher education (7). It will be seen that there is a fair degree of commonality with the corresponding word-cloud for the *Aslib Proceedings* articles in Figure 1.

A more detailed picture of the areas of expertise and interest in the LIS research landscape was obtained by categorizing the complete set of 605 keywords and phrases. For pragmatic reasons each keyword was considered just once, e.g. Library Research was assigned to the category *Research and Evaluation* as research is the main focus of the topic, and Information

Society was assigned to *Social and Environmental Issues and Contexts*. Twelve key research themes or broad categories emerged, as shown in Table 10. An example of a taxonomy of librarianship research that already exists is that described by Crumley and Koufougiannakis; this has been used in evidence-based librarianship, and has been developed further

Categories of LIS research	**Count**
Research and Evaluation	83
Longitudinal Study, Research Cultures, Systematic Reviews	
Library and Information Services	71
Academic Libraries, Information Services, Librarianship	
Computing and Information Systems	65
Human Computer Interaction, Networks, Systems	
Social and Environmental Issues and Contexts	64
Lifestyles, Social Structures, United Kingdom	
Education, Teaching, and Learning	57
e-Learning, Higher Education, Teaching	
Information Use	56
Information Retrieval, Information Seeking, Search Behaviour	
Business Industry and Management	56
e-Commerce, Marketing, Strategy,	
Knowledge and Information Management	42
DIKW Hierarchy, Knowledge Sharing, Wisdom,	
Publishing, Writing and the Book	40
Bookselling, Publishing, Writing in Disciplines	
Information Organization	29
Classification Schemes, Collections, Indexing,	
Archives and Records Management	23
Archives, Digital Preservation, Record Keeping	
Mobile Technologies and Media Communications	19
Communications, Mass-Media, Mobile Technologies	

Table 10. Categorization of 605 keywords based on RAE outputs published 2006-07. Each italicized category is accompanied by three typical keywords or phrases in that category

byKoufougiannakis *et al*. [xxi] However, neither of these taxonomies adequately covered the breath of research topics apparent in the RAE submissions: the former has six categories (Reference/Enquiries, Education, Collections, Management, Information Access & Retrieval, and Marketing/Promotion); and the latter has Professional Issues added, but with Marketing/Promotion being merged into Management. There are similarities in our categories to those identified by Koufougiannakis *et al*., but with additional categories to encompass the broader scope of expertise and research interests in information and communication technologies, and also cross-disciplinary research not covered by the existing categories, e.g., *Social and Environmental Issues and Contexts*.

The categorization shows a body of words and phrases related to research and evaluation, as well as traditional areas such as library and information services. There are smaller pockets of interest in information organisation, archives and records management, and emerging topics such as mobile technologies and media communications. The relationships between the categories, and some of their more specialist research sub-themes are mapped in Figure 3,

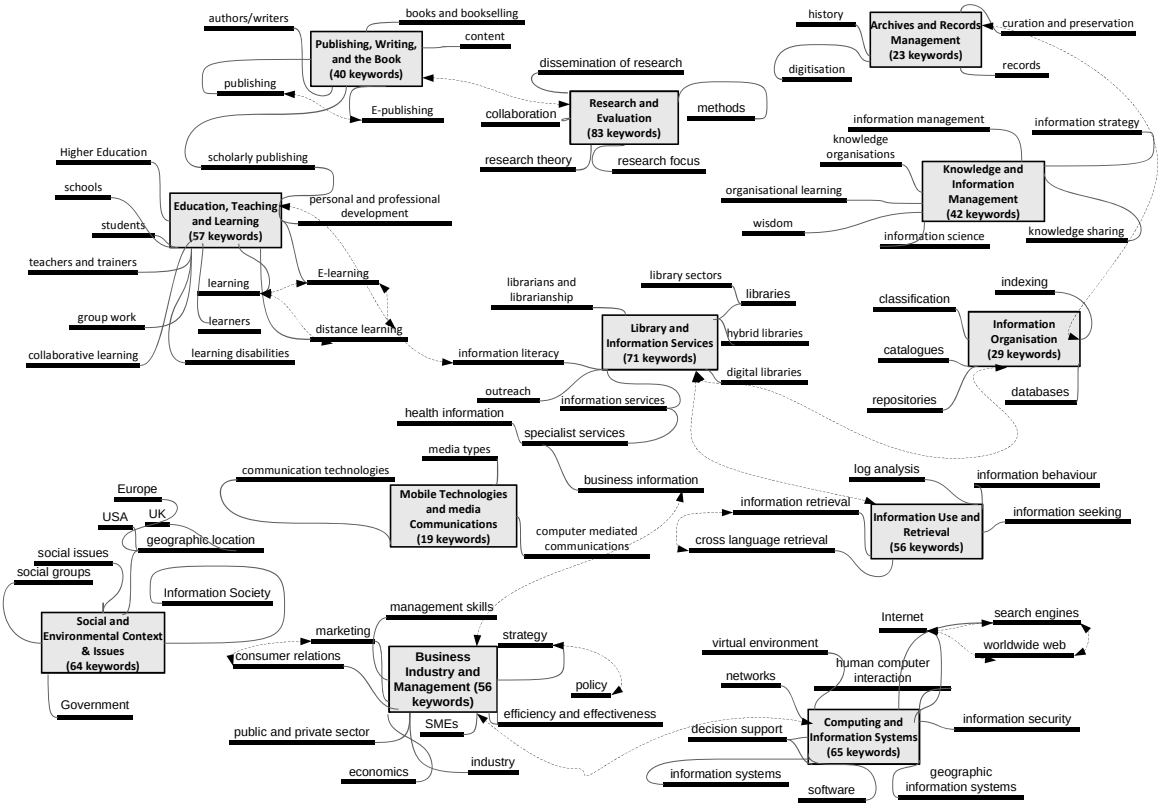

Figure 3. The LIS research landscape. Main research areas based on RAE outputs published in 2006-07, and categorised into twelve main themes and their associated sub-themes.

which was created using Microsoft Visio. The figure makes clear the pervasive, inter-disciplinary nature of LIS, with research being carried out across a range of disciplines such as, business and management, communications, computer science, education, and the social sciences more generally.

This analysis reinforces the comments made in the RAE2008 Subject Overview Report on the changing nature of the research agenda, and subsequently discussed by Feather: 'There was less historical work in the submissions, and more work on information and knowledge management and on the dissemination, retrieval, and publication of information, including work in the field of humanities computing deriving from research in information management, and work in Geographic Information Systems'. [viii, xiii]

Feather stressed the importance of cross and interdisciplinary research, and the need for LIS researchers to take their place in the 'wider world of academic research', expanding the reach across science and social science disciplines. Key to achieving this is collaborative and inter-disciplinary research practice and to use and adapt methods and approaches that are widely used in other disciplines. Eldridge reported on the past popularity of the case-study approach in LIS research, and identified a growing utilization of other research methods.[xvii] Our analysis reinforces this finding with the case study still popular (and being one of the frequent keywords in Figure 2) but with a wide range of research methods and approaches identified in the keyword analysis. Thirty three different research methods, both quantitative and qualitative, were identified including action research, case studies, discourse analyses, framework analyses, Grounded Theory, log analyses, longitudinal studies, narrative studies, observation, surveys, and systematic reviews, *inter alia*. The use of such a wide selection of methods mirrors that seen in the *Aslib Proceedings* special issues and exemplifies the well developed research cultures in LIS departments that were noted by the RAE2008 panel.[viii]

Conclusions

Nicolas's previous review of LIS research covered the period 2001-2005. It is sobering to think that Facebook and YouTube were founded at the end of that period, in 2004 and 2005 respectively, and that since then we have seen the emergence of such staples of the modern world as Twitter, the iPhone and the iPad (in 2006, 2007 and 2010, respectively). This continuing, indeed increasing, digitization of society will undoubtedly affect the subjects investigated by LIS researchers, even if there is continuing interest in long-established topics such as bibliometrics, information behaviour, information retrieval and public library management.

The precise subjects to be studied in the future will depend not just on technological developments and the funding sources that are available (*vide supra*) but also on the individuals available to carry out the research. In this respect, 2006-10 saw a marked 'changing of the guard' as several of the country's leading researchers retired (though some continue their research for the present in emeritus and/or visiting roles). Thus, City saw the retirement of Jonathan Raper and Stephen Robertson, Loughborough of Charles Oppenheim, Cliff McKnight and Paul Sturges, and Sheffield of Micheline Beaulieu. Other notable departures included Mark Sanderson and Steve Whittaker leaving Sheffield for positions in Australia and the USA, and Fabio Crestani and Monica Landoni leaving Strathclyde for positions in Switzerland. However, departments continue to attract world-class researchers, with the UK's LIS reputation being demonstrated by Amada Spink coming to Loughborough from Australia and Elaine Toms coming to Sheffield from Canada. It is also appropriate to note here the deaths (in 2007, 2009 and 2010 respectively) of Kären Sparck Jones, Brian Vickery, and Maurice Line, three of the country's leading LIS researchers.

A further death, in 2006, was that of Brian Perry, the Director of the BLRDD from 1984 to 1995 when it was at the peak of its success. His many contributions to LIS research in the UK were marked by a workshop entitled *Looking Back to the Future*, where delegates

highlighted the need for a structure (real or virtual) to enable the organisation, co-ordination and implementation of LIS research. This lead to the establishment of the Library and Information Science Research Colloquium in 2009. [xxii] The Coalition is a membership organization, with the members at the end of 2010 including the British Library, the Chartered Institute of Library and Information Professionals, the Committee on Library Cooperation in Ireland, the Joint Information Systems Committee, the Museums, Libraries and Archives Council, the Research Information Network, and the Strategic Health Authority Library Leads Group. As this list suggests, the Coalition has a strong practitioner focus, with its principal objectives being: to bring together information about LIS research opportunities and results; to encourage dialogue between research funders; to promote LIS practitioner research and the translation of research outcomes into practice; to articulate a strategic approach to LIS research; and to promote the development of research capacity in LIS. This agenda is clearly ambitious, especially given the current financial situation in the UK, but if successful will go some way to bridging the considerable gap that exists between LIS academics and practitioners. It will be interesting to judge the success of the Coalition initiative when the time comes to survey UK LIS research for the period 2011-2016.

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