

Re-skilling for Research

An investigation into the role and skills of subject and liaison librarians required to effectively support the evolving information needs of researchers

Conducted for RLUK by Mary Auckland, OBE MSc HonFClip

January 2012

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Preface

It is clear that as the nature of research within our institutions changes, so must the role of the library in supporting research. The increasingly competitive research environment demands greater collaboration (across discipline, institutional, and national boundaries) and generates greater quantities of data than ever before. In addition, funders are placing increased emphasis on the demonstration of the impact of research outputs and engendering wide dissemination of research findings.

As research activities evolve, research support must evolve with it. There has been much debate within libraries as to what form this evolution will take - but little consensus in terms of the part to be played by the library in general, or the role of library staff members in particular. What discussions there have been have tended to focus on support and liaison librarians as the natural constituency to fulfill the new research requirements.

RLUK has been keen to determine what the new requirements of researchers are, and how best these needs can be met by the library. We want to place the needs of the researcher in the context of the library's current offering, and look at how we must change to fulfill the new demands placed upon us.

This report, *Re-skilling for Research*, takes us a long way to mapping these requirements. It looks in detail at researchers' information needs (Section 2) and begins to outline the skills and knowledge that are required to meet those needs (Section 3). Section 4 offers a comparison of different models of library support for researchers, with valuable comparisons of current job descriptions. Finally, the report explores issues around the training opportunities for subject librarians to acquire the additional skills and knowledge they will need to fulfill their new roles.

A report such as this does not provide a definite set of answers, but initiates a valuable process, highlighting a number of activities for individual institutions, associations such as RLUK, library schools, etc. We hope that Mary Auckland's excellent work in the report will be the start of a vigorous discussion that helps to redefine the place of the library in the research process.

David Prosser

Executive Director, RLUK

Executive Summary

RLUK, Research Libraries UK is a long-established consortium of the top research-led institutions in the UK and Ireland. The consortium has successfully initiated new ideas, plans, projects and services with the single aim of providing some of the best support for research libraries and information services in the UK and beyond.

RLUK is aware of the considerable recent discussion and analysis of researchers' needs and the continuing rapid changes in the research landscape. The survival of the subject/liaison role in libraries is dependent on an agile and flexible response by staff in those roles, and by their managers. While much work has been done in recent years to re-energise support for teaching and learning, more is still required to develop subject/liaison support for research, despite the emergence of new roles, such as data librarians. RLUK commissioned Mary Auckland to undertake a study to map the information needs of researchers onto tasks to be undertaken by Subject Librarians, information specialists and liaison staff, in order to develop the skills sets of existing staff to ensure they meet the needs of a constantly changing research environment.

The study consisted of four work packages of information gathering and analysis. The first consisted of an exploration of the information needs and information seeking behaviour of researchers and mapping the role of Subject Librarians to these needs. Information was gathered from a review of current literature, returns from 23 libraries to a short questionnaire, and the additional documentation they provided. What is clear is that researchers are not a homogeneous group. Their activities, discourse, approaches to research, and their information needs differ, in particular in relation to their discipline and/or subject and its culture and praxis, and the stage of their career. Researchers have diverse information and related needs depending, for example, on their discipline and the stage of their career. To most effectively provide the support and services needed to meet these needs Subject Librarians must have a deep understanding of what they are – one size does not fit all. They will need to keep abreast of the findings of ongoing investigations into researcher behaviour and respond accordingly, not by trying to restrain and mould researcher behaviour to the old modes of service and support, but by embracing the new ways and designing innovative and responsive approaches. To date, Subject Librarians have supported the needs of researchers through relatively traditional services revolving around information discovery, collection development and some elements of information management. The survey of participating libraries and the literature provide evidence for a shift in the nature of support and services, which are becoming more diverse and extensive, and moving beyond purely information-related activities and towards a greater emphasis on research data management in particular. They recognise the importance of the research

agenda to their institutions and of giving it appropriate and relevant support, and a range of new roles for Subject Librarians are being explored and embedded. These issues are explored in more detail in Chapter 2 of the Report.

To support the information and related needs of researchers expertly, now and in the future, and to perform the roles identified in Chapter 2, Subject Librarians will need to have a set of skills and knowledge, and be able to apply these appropriately. The second work package focused on reviewing the skills sets required to support researchers. The study identified a set of 32 skills and areas of knowledge that Subject Librarians currently need, or will need in the future, to varying degrees, if they are to perform the tasks discussed earlier that will provide the support researchers require. 169 Subject Librarians and their managers from 22 RLUK member libraries completed a web-based survey designed to validate the skills and knowledge areas identified, and to assess the extent to which Subject Librarians currently have these skills and how important they felt they would be in the future. The full details of the 32 skills and knowledge areas, and the findings of the skills' gap survey are given in Chapter 3.

Most significantly, the findings indicate that there is a high skills gap in nine key areas where future involvement by Subject Librarians is considered to be important now and is also expected to grow sharply. It is in these areas that consideration needs to be given, and decisions made, with respect to training and development, and recruitment. The nine areas are listed below:

- Ability to advise on **preserving research outputs** (49% essential in 2-5 years; 10% now)
- Knowledge to advise on **data management and curation**, including ingest, discovery, access, dissemination, preservation, and portability (48% essential in 2-5 years; 16% now)
- Knowledge to support researchers in **complying with the various mandates of funders**, including open access requirements (40% essential in 2-5 years; 16% now)
- Knowledge to advise on potential **data manipulation tools** used in the discipline/ subject (34% essential in 2-5 years; 7% now)
- Knowledge to advise on **data mining** (33% essential in 2-5 years; 3% now)
- Knowledge to advocate, and advise on, the use of **metadata** (29% essential in 2-5 years; 10% now)
- Ability to advise on the **preservation of project records** e.g. correspondence (24% essential in 2-5 years; 3% now)
- Knowledge of **sources of research funding** to assist researchers to identify potential funders (21% essential in 2-5 years; 8% now)
- Skills to develop **metadata schema, and advise on discipline/subject standards and practices**, for individual research projects (16% essential in 2-5 years; 2% now)

In Chapter 4 some of the 'traditional' and new models being employed to engage with researchers are considered, based primarily on the information provided by participating libraries. Other related relevant Library posts supporting researchers, Subject Librarians' job descriptions, and staffing structures are also

discussed. There is a clear trend towards providing support for research that is driven more by the requirements of researchers than it has been in the recent past, and a movement in some institutions towards a more proactive model of engagement with researchers. Alternative routes to providing 'library' support for researchers, include the 'classical' method of deploying Subject Librarians, the emerging model of greater engagement and embedding them, and a more hybrid model of support in which new library posts are being created. Another objective of the study, covered in Chapter 6, was to review alternative models of information support for researchers that may bypass traditional 'library' support, based on information from the literature and the returns from participating libraries. A variety of alternative models, indeed sources, of support and services that researchers can turn to in order to meet their information and related needs are identified, and research libraries and their Subject Librarians face the challenge of ensuring that they remain relevant and visible in this environment of diverse support and service provision. Libraries will need to make every effort to collaborate (liaise seems to be a very passive and inadequate concept in this context) with these 'competitors' who are also potential partners, to change the challenge they present into an opportunity, and to ensure the best possible support for researchers and the best value for money for their institutions.

Work package 3 investigated training opportunities, and gaps, for existing and future Subject Librarians, and Chapter 5 explores the opportunities for them to acquire any additional skills and knowledge they need to perform their role in support of researchers. It draws on information gathered from the participating libraries about the methods they currently utilise to provide training and development opportunities, and on a survey completed by eleven organisations known to provide training, and another completed by 18 Schools of Library and Information Studies in the UK, continental Europe, North America and Australia.

The majority of the training and development activities reported in the survey of libraries centred around 'core' skills and the more traditional methods of supporting research, although events designed to improve the skills of Subject Librarians and their capability to support research in new ways are being provided, albeit on a lesser scale. The small number of respondents to the survey sent to training providers makes it difficult to assess the current situation with confidence, but it does appear that there may be limited opportunities to acquire many of the new skills and knowledge areas in which Subject Librarians identify a skills gap, from a core group of large training providers. It is more likely that opportunities will need to be carefully sourced from a very wide range of providers, often outside the normal 'library' arena. There is considerable scope for RLUK to work in partnership with appropriate training providers to develop the training and development programmes that are increasingly going to be needed by Subject Librarians who support researchers. All of the skills and knowledge areas are

currently covered to a greater or lesser extent in the Library Schools that responded to the survey. Although they are providing more of a generic offering, and have little scope for producing graduates with the level of skills and knowledge to become Subject Librarians able to effectively support researchers.

Chapter 7, the concluding chapter reflects on the findings of the study that will, hopefully, enable RLUK and its members to plan the best possible fit between assessed needs and present and future staffing profiles. Libraries, and their staff (including Subject Librarians) who have a responsibility to support and provide services for researchers, face a huge challenge that could be turned into a huge opportunity. The literature about researchers' information and related needs and behaviour, points to a trend of them bypassing the library as a source of support and services. Libraries will need to respond to this challenge by developing a unique role in consultation with their institution for the part they will play in the support of meeting researchers' information and related needs. The research environment is changing, driven not least by the power of technology to transform the way researchers work. Libraries are largely in uncharted territory, and have the chance to draw a new map of support and services for researchers.

This investigation has highlighted an exciting and demanding new role for Subject Librarians in supporting the information and research data needs of researchers that embraces a range of new and modernised services and support, and that builds on their existing traditional and valued role. A shift can be seen which takes Subject Librarians into a world beyond information discovery and management, collection development and information literacy training, to one in which they play a much greater part in the research process and in particular in the management, curation and preservation of research data, and in scholarly communication and the effective dissemination of research outputs. To be able to fully deliver this new role Subject Librarians need to have the skills and knowledge required to perform it expertly and with confidence. This study has uncovered a skills gap in a number of key areas which will need to be bridged through training and development of the existing workforce, and the recruitment of new staff with the necessary skills and knowledge. No obvious sources for the provision of this training and development were uncovered, and it is likely that new partnerships between research libraries, RLUK and various training providers will need to be forged to fully capitalise on the deployment of those people that already have the required skills and are able to impart them to others. The demand for this enhanced role for Subject Librarians is already being felt in research libraries, and is likely to grow considerably over the next 2 - 5 years, unless researchers are forced to look elsewhere because the workforce is not quickly and fully prepared and equipped with the skills and expertise to support them.

Building on existing competencies may only be part of the picture if research libraries are to continue to provide responsive and relevant support and services to support the information and data management needs of researchers. The support and services research libraries are charged with providing will have to be clearly articulated and their benefits expressed in terms of researchers' needs and how these will be met actively, they will have to be delivered within a timeframe that corresponds to researchers' patterns of work, and they will have to be vigorously and assertively promoted. They will need to ensure they have staff who embrace the role they play and feel confident and skilled to deliver the support and services expected of them, and they will need to do it soon.

Acknowledgments

Many people contributed to the findings in this report. The respondents to the initial survey of libraries, drawn from the UK and internationally, willingly provided a wealth of candid, detailed information about the roles and skills of their Subject Librarians that was invaluable to the study. Subject Librarians and their managers in the RLUK member libraries provided a picture of their current and future knowledge skills sets, and Schools of Library and Information Studies and trainers contributed information about how some of these skills might be imparted to the workforce. Not all the information gathered could be used in the report but will be made available to the RLUK Steering Group as a separate body of information. Antony Brewerton and the RLUK Project Steering Group (see Appendix A for the membership) provided invaluable support and guidance throughout the period of the study. A special thank you has to go to a proof reader extraordinaire and his wise comments and eagle eye.


1 Introduction

1.1 About RLUK

RLUK, Research Libraries UK is a long-established consortium of the top research-led institutions in the UK and Ireland. The consortium has successfully initiated new ideas, plans, projects and services with the single aim of providing some of the best support for research libraries and information services in the UK and beyond. In over 25 years of activity, RLUK has sponsored some of the major free online UK resources in support of research, including Copac, the *de facto* UK Union Catalogue of over 35 million books and serials, the Archives Hub, a national gateway to descriptions of archives in UK universities and colleges, and the award-winning SHERPA services¹, which are developing open-access institutional repositories in universities to facilitate the rapid and efficient worldwide dissemination of research.

1.2 The Project

RLUK is aware of the considerable recent discussion and analysis of researchers' needs and the continuing rapid changes in the research landscape. The survival of the subject/liaison role in libraries is dependent on an agile and flexible response by staff in those roles, and by their managers. While much work has been done in recent years to re-energize support for teaching and learning, more is still required to develop subject/liaison support for research, despite the emergence of new roles, such as data librarians.



“While there is general agreement that liaison roles are changing, research libraries are grappling with defining the scope of these new roles. Identifying emerging roles, determining what work to let go of, designing supportive institutional structures, and ensuring that liaisons [*sic*] have needed skills and knowledge present challenges.”

ARL website



An initial overview of job descriptions and literature on the role of Subject Librarians, information specialists and liaison staff suggested that role descriptions are ‘library orientated’ rather than orientated towards the needs of the research community.²

RLUK commissioned Mary Auckland to undertake a study to map the information needs of researchers onto tasks to be undertaken by subject librarian, information specialist and liaison staff (hereafter referred

¹ www.sherpa.ac.uk/index.html

² Brewerton (2011)

to as Subject Librarians), in order to develop the skills sets of existing staff to ensure they meet the needs of a constantly changing research environment.

Several of the contributors to the study commented on how timely the study is, and a number of other organisations are currently exploring the library roles and skills needed to support researchers. The picture is similar internationally. LIBER (The Ligue des Bibliothèques Européennes de Recherche) has a Steering Committee looking at the skills and organisational structures needed in research libraries today³. OCLC are exploring a number of issues in their Research Information Management initiative in order to “reach a collective understanding of the responsibilities of, and opportunities for, libraries in a changed research environment”⁴. The Association of Research Libraries (ARL) reports that its libraries are ‘increasingly exploring and adopting a range of new roles in serving research institutions, researchers, scholars, and students’. It has commissioned a ‘report cluster’ and webcasts focusing on key new roles which will “identify and delineate emerging roles” drawing on the experience of their member libraries. This work is still in progress⁵.

The study focuses on the role of Subject Librarians in the support of researchers rather than on the larger picture of the strategic issues for libraries. By and large therefore the role of libraries generally, and related university activities in support of researchers, are not explored in detail. Other studies are, or have, focused on this wider perspective. For example 'Towards the academic library of the future'⁶ - a project funded by the British Library, JISC, the Research Information Network (RIN), RLUK and the Society of College, National and University Libraries (SCONUL), and the proceedings of two recent symposia held in the USA. One of these was hosted by the Council on Library and Information Resources⁷, and the other⁸ was held at The University of Texas at Austin.

³ www.libereurope.eu/node/458

⁴ www.oclc.org/research/activities/rim.htm

⁵ www.arl.org/rtl/plan/nrnt/index.shtml

⁶ www.rin.ac.uk/our-work/using-and-accessing-information-resources/towards-academic-library-future

⁷ Council on Library and Information Resources (2008)

⁸ www.lib.utexas.edu/symposium/

1.3 Methodology

The major part of the study, information gathering and analysis consisted of four work packages:

Work package 1, carried out in Summer 2010, focused on a review of Subject Librarian roles, and consisted of:

- An exploration of the information needs and information seeking behaviour of researchers, and the role of Subject Librarians supporting these, and mapping the role of Subject Librarians to the needs of researchers.
- An environmental scan of 'subject librarian' job descriptions, staffing structures and models of researcher support.

Research libraries, once proud curators of historic print collections, face enormous challenges in this digital marketplace. The philosophy of warehousing large book collections, 'just-in-case-they're needed', is rapidly becoming redundant as users turn their backs on the library as a physical space. Instead, research libraries are having to adjust to a new reality: the need to compete for attention among user groups, especially the young, who demand involving, dynamic and personalised content experiences that can compete with the likes of Facebook.

CIBER (2008)

Information was gathered from a review of current literature

(see Appendix B), returns from 23 libraries to a short questionnaire (see Appendix C), and the additional documentation they provided. The participating libraries were selected to give a good national and international spread and because they were known to be actively supporting researchers based on the knowledge of the investigator and the project Steering Committee, and information on their web sites.

They were:

University of Canterbury, New Zealand

Cardiff University Information Services

Columbia University Library, USA

Durham University Library

University of Edinburgh, Information Services

University of Hong Kong Libraries

Leeds University Library

Liverpool University Library

London School of Economics and Political Science Library

The University of Manchester, John Rylands University Library

University of Maryland Libraries, USA

University of Melbourne Library, Australia

Monash University, Australia

Newcastle University Library

Purdue University Library, USA

University of Northumbria Library and Learning Services

Rice University, Fondren Library, USA

Southampton University Library

University of Sydney

Tilburg University Library

University of Toronto Libraries, Canada

Trinity College Dublin Library, Ireland

University of Warwick Library

Throughout the Report, libraries are referred to collectively as the 'participating libraries', and individually by an abbreviated version of the name of their institution, normally the city in which they are located.

The findings of this work package are used throughout the report, but inform Chapter 2 in particular.

Work package 2 focused on reviewing the skills sets required to support researchers and consisted of:

- Defining the knowledge and skills sets required by Subject Librarians to support researchers based on the information gathered in work package 1.
- A validation of the relevance of the knowledge and skills sets identified
- An analysis of the extent to which Subject Librarians and their managers think the skills are currently available, and have future relevance, based on the survey of participating libraries and a web-based survey completed in 22 RLUK member libraries, conducted in late Summer 2010.

The findings of this work package are detailed in Chapter 3.

Work package 3, carried out in Autumn 2010, reviewed relevant training and development activities currently available in the sector to investigate training opportunities, and gaps, for existing professionals. This was based on desk research, a short web-based survey sent to a selection of 28 organisations known to provide training for librarians or who might have an interest in doing so, and information obtained from participating libraries about the methods they currently utilise to provide training and development opportunities. Eleven organisations completed the survey (two chose to remain anonymous):

CILIP Training and Development	Research Councils UK (RCUK)
Economic and Social Research Council (ESRC) researcher development section	Research Information Network (RIN)
Hudson Rivers Management and Training Consultants	SALCTG (Scottish Academic Libraries Co-operative Training Group)
Netskills	UKSG
	Vita

In addition, the 16 UK Schools of Library and Information Studies providing CILIP accredited courses, and a sample of 20 European, North America and Australian Schools, were similarly surveyed to identify training opportunities and gaps for new entrants, and to explore opportunities for RLUK to work with them to ensure new professionals are equipped to work effectively in the current and emerging research environment. The term Schools of Library and Information Studies is used as a generic term to include all the schools and departments surveyed.

18 Schools, from the following universities, completed the survey:

Aberystwyth University	Bristol Institute of Technology, UWE
University of Brighton	British Columbia University
Dalhousie University	Rutgers, the State University of New Jersey
University of Glasgow	Simmons College
Liverpool John Moores University	University of South Australia
London Metropolitan University	Strathclyde University
Manchester Metropolitan University	Syracuse University
Queensland University of Technology	Thames Valley University
Robert Gordon University	University College London

The findings of these surveys are detailed in Chapter 5

Work package 4 considered some potential alternative models of information support for researchers that may bypass traditional 'library' support, based on information from the literature and the returns from participating libraries.

The details are given in Chapter 6.

2 Researchers' information and other needs, and the role of Subject Librarians in supporting them

2.1 Researchers and their information and other related needs

A brief review of current literature exploring researchers' information and related needs and their information seeking was conducted (see Appendix B) and the findings of these studies provides context for the work of Subject Librarians, and insights that will enable them to identify and deliver appropriate and responsive services and support.

What is clear from the literature is that researchers are not a homogeneous group. Their activities, discourse, approaches to research, and their information needs differ, in particular in relation to their discipline and/or subject and its culture and praxis, and the stage of their career. Connaway and Dickey⁹ reviewed evidence from projects funded by the Joint Information Systems Committee (JISC) to begin to develop a profile of today's researcher. They identified examples of ways in which researchers in different disciplines behave differently and have different needs. They found, for example, that science researchers are more likely to use digital repositories and a VRE and more likely to use Twitter, while mathematicians and computer scientists are more predisposed to archive their own material, and, like classicists, to disseminate their research outputs themselves. Social scientists on the other hand are more reluctant to use new technologies, for example they are less likely to Tweet or use a laptop at a conference. A Research Information Network (RIN) and JISC study found that motivations to publish in different formats differ significantly across disciplines¹⁰. RIN with the British Library (BL) has also commissioned a series of case studies¹¹ looking at how researchers use information in the life sciences, physical sciences, humanities and in collaborations. The case studies in the life sciences highlighted "the considerable variances in practice for information use and exchange amongst the groups...studied"¹², and there is no reason to expect that the findings of the others will do otherwise.

Other studies have concentrated on researchers at different stages of their careers. James *et al*¹³ focused on 'early career researchers' (ECRs), PhDs and postdoctoral researchers, in the first few years of their careers and the way they work, providing potential insights into the library services and support that might meet their information and other needs and how these might best be delivered.

⁹ Connaway and Dickey (2009)

¹⁰ Research Information Network and the Joint Information Systems Committee (2009)

¹¹ www.rin.ac.uk/our-work/using-and-accessing-information-resources/disciplinary-case-studies-life-sciences

¹² Research Information Network and the British Library (2009)

¹³ James *et al* (2009)

Bent *et al*¹⁴ categorise a researcher's learning life into a series of stages which they call the Seven Ages of Research. They link the learning needs of researchers to each stage and link these to the development of information literacy. The Seven Ages they identified are:

1. Masters students
2. Doctoral students
3. Contract research staff
4. Early career researchers
5. Established academic staff
6. Senior researchers
7. Experts

The recognition of the differences in researchers' information needs and information seeking behaviour is not new. For example, the Information Requirements of the Social Sciences study led by Maurice Line in the 1960s aimed to discover how social scientists used information^{15,16}. This and other earlier studies had significant impact and will have had an ongoing influence on Subject Librarians over the years. But changing client expectations, the vast changes in information and communications technologies, and a harsher economic climate make it imperative in the current environment that Subject Librarians can respond knowledgeably and innovatively to the diverse needs of researchers. They need to be aware of, understand the differences, and carefully assess the individual needs of the researchers or groups of researchers they are supporting, taking account of these in service and support delivery.

Researchers live by 'satisficing' (accepting an adequate answer or solution over an optimal one) to quote a recent OCLC report¹⁷ and they require support that is driven by their needs, "integrated into their workflows, available at the point of need, is good enough and is discipline specific". A common concern of researchers is time pressure or constraints. ECRs for example argue they need "tools which fit into their busy and varied lives, and which do not come with a heavy training overhead"¹⁸, and the RIN/BL study concluded that one reason for researchers' restricted choice of information tools and resources is that they have limited time to review the whole information landscape¹⁹. They want services and support that are easy to use, with minimum overheads, and that fit in with their workflows; and they are looking for more personalised services.

¹⁴ Bent *et al* (2007)

¹⁵ Line (1971)

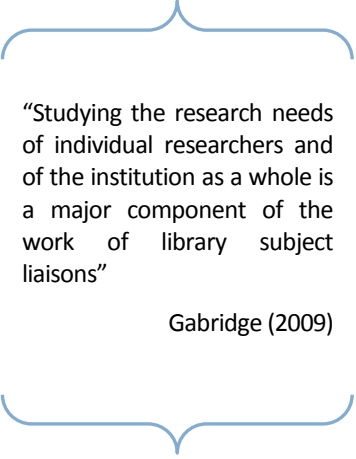
¹⁶ Line (1999)

¹⁷ Prabha *et al* (2007)

¹⁸ James *et al* (2009)

¹⁹ Research Information Network and the British Library (2009)

Gabridge²⁰ highlights the importance of Subject Librarians understanding the needs of researchers: “Studying the research needs of individual researchers and of the institution as a whole is a major component of the work of library subject liaisons. As such, these librarians are well positioned, and will be essential in building the “last mile” of research data cyberinfrastructure—the part of the network that will provide connections between the systems and the researchers, and ultimately, to new users of the data”. The RIN and BL report on the research patterns in life sciences concludes that the evidence from the seven case studies



“Studying the research needs of individual researchers and of the institution as a whole is a major component of the work of library subject liaisons”

Gabridge (2009)

concluded so far “has a direct bearing on the provision of institutional information services (IIS) for these specific subjects and perhaps others” and that the difference in researchers’ behaviour “represents a major challenge for IIS providers intent on supporting a broad range of research”²¹. Many of these issues were explored in depth in the RIN and Consortium of University Research Libraries (now RLUK) report that examined researchers’ use of academic libraries and their services²². All of these patterns of behaviour by researchers, and their information and related needs, are in flux and will change as new cohorts of people enter the research arena. It is essential that Subject Librarians stay abreast of the changes and respond quickly in delivering their support and services.

2.2 Role of the Subject Librarian

The picture of the current and changing role of Subject Librarians is one of considerable flux. Activities considered current in one institution are seen as potential activities for the future in another. In some research libraries, Subject Librarian roles are changing and expanding to accommodate new responsibilities, while in others specialist posts are being created to perform them. Some of these models are explored in greater detail in Chapter 4. What is clear from this current study, from other recent studies, and from the responses from the participant libraries, is that university research libraries recognise the need for a sea change in the support that libraries and Subject Librarians give to researchers, and are responding to the challenges. How they are doing this is looked at in more depth in section 2.3 below. Information about the role that Subject Librarians play in meeting researchers’ needs was gathered from the survey returns received from participating libraries and recent literature. It was also drawn from the findings of two studies conducted last year for the Open University that looked at the training needs of

²⁰ Gabridge (2009)

²¹ Research Information Network and the British Library (2009)

²² Research Information Network and the Consortium of University Research Libraries [now RLUK] (2007)

their Learning and Teaching Librarians²³. Much of the literature relating to the role of Subject Librarians has until recently focussed on activities supporting teaching and learning. In all that follows, those activities specific to teaching and learning support, as well as any generic duties and responsibilities such as maintaining web pages, enquiry desk work, are, by and large, taken as given, and attention has inevitably been given to the role of Subject Librarians in relation to their support of research.

“Librarian roles are constantly evolving as the client demands evolve, so we evaluate and create new services to better support these demands”

University of Sydney

2.3 Researchers’ needs and the services and support provided by Subject Librarians

In this section, stages of the research life cycle are used as a framework for mapping the current and potential future roles of Subject Librarians to the needs of researchers. The life cycle model used has been developed to best illustrate the intersection of researchers’ needs and Subject Librarians’ roles. It is important to remember that the model is a tool to help systematise and map, while in reality “the fine structure of research and information activities does not conform to a simple linear or cyclical model”²⁴.

“The Library will become a clear and critical component of a central service that addresses all aspects of the research lifecycle.”

University of Edinburgh

While it is important for Subject Librarians to be aware of the distinctions between different types of researchers, it is also crucial for them to have an understanding of the activities that researchers generally engage in during the ‘research life cycle’ because it is here that many library services currently intersect and support their work, and where the potential for new services can be identified. A recent RIN/BL report warns that, “There is a significant gap between how researchers behave and the policies and strategies of funders and service providers”²⁵. Without a good and current understanding of researchers’ information needs and information seeking behaviour there is a danger that Subject Librarians will be unable to deliver the support and services that are really needed.

At Purdue, Subject Librarians have become more proactive at engaging researchers, using a variety of methods ranging from participating in formal and informal meetings to becoming part of a research project team, to discuss researchers’ activities, assess their needs, and identify strategic opportunities to act on. At Minnesota they work closely with researchers to understand their changing workflows and patterns of scholarly communication, and at Maryland they “work closely with faculty...to determine their

²³ Open University (2009a); Open University (2009b)

²⁴ Research Information Network and the British Library (2009)

²⁵ Research Information Network and the British Library (2009)

teaching and research needs". Warwick observed that, in planning to develop services to meet wider researcher needs, they are "scanning the micro-environment (and to a degree the macro-environment) to gain a greater understanding of those needs and where the Library fits into /could fit into the wider University support mechanism". At Northumbria the Research Support and Collection Development team has worked with other Library colleagues to run focus groups with researchers to identify their needs with regard to space and collaborative research facilities.

2.3.1 Conceptualising new research, developing proposals, and identifying funding opportunities

This initial stage of research is likely to involve the researcher in reviewing the published literature and other earlier research outputs, and exchanges with colleagues. As well as developing a proposal for the research aims, methodology etc., a grant writer will probably have to produce costings and a project plan²⁶. The researcher may also be seeking funding at this stage; this is a concern especially for the ECR but even the established researcher is concerned with finding grant funding^{27,28}.

On the whole there is little indication that Subject Librarians are actively engaged in this phase except in a few libraries where they are beginning to be engaged in research projects. Subject Librarians at Melbourne, for example, are offering support and providing assistance with grant applications, and at Leeds they occasionally co-author funding bids as part of a research team. Some are also providing information about funding sources.

"In general terms, this new form of information seeking behaviour can be characterised as being horizontal, bouncing, checking and viewing in nature. Users are promiscuous, diverse and volatile and it is clear that these behaviours represent a serious challenge for traditional information providers, nurtured in a hardcopy paradigm and, in many respects, still tied to it. Libraries must move away from bean counting dubious download statistics, and get much closer to monitoring the actual information seeking behaviour of their users."

CIBER (2008)

2.3.2 Seeking new information

Researchers now have more 'global and unbounded access to resources and content'²⁹ than ever before, and the plethora of available information makes it harder and harder to know which sources to consult.

²⁶ Research Information Network and the British Library (2009)

²⁷ James et al (2009)

²⁸ Bent et al (2007)

²⁹ Association of Research Libraries (2010a)

Researchers want to be able to identify the resources that are relevant to them, to narrow searches, and retrieve information effectively³⁰. Their methods of discovering information resources are varied but the literature indicates that because of its ease of use, many rely heavily on Google as a major information discovery point³¹. For example the participants in the RIN/BL life sciences case studies “regard Google as the ultimate enabler. They like its ease of use, its word-search capability and its ostensibly large index...Thus searches often deliver serendipitous contextual information in addition to what is expected”³². A report from CIBER into the information behaviour of researchers of the future, commissioned by JISC and the BL, also found that search engines, especially Google, are the starting point for much information discovery. They make the point that it is not only the young, the ‘Netgen’, for whom this is true: “... it would be a mistake to believe that it is only students’ information seeking that has been fundamentally shaped by massive digital choice, unbelievable (24/7) access to scholarly material, disintermediation, and hugely powerful and influential search engines. The same has happened to professors, lecturers and practitioners. Everyone exhibits a bouncing /flicking behaviour, which sees them searching horizontally rather than vertically. Power browsing and viewing is the norm for all”³³. Researchers’ access to the information they need is frequently “through direct access to web-based resources, including bibliographic search and retrieval tools, on-line scientific publications, and dedicated websites that they trust”³⁴.

The RIN/BL report also found that researchers are not overly concerned with the “partial and potentially unmediated set of results”³⁵, which is a finding supported in other studies and with other groups of researchers. The RIN/CURL study found, for example a “tendency on the part of researchers: a ‘good enough’ and not necessarily rigorous approach which relies on finding aids with which researchers are familiar or which produce some sort of result”³⁶. They also found that researchers do not on the whole find printed finding aids useful and are more reliant on electronic tools. A recent OCLC study identified similar findings³⁷. However, researchers do also use other sources, such as discipline-specific databases, and informal advice from colleagues to identify relevant information resources. Researchers also have a need to keep up-to-date with the information and literature being published³⁸.

³⁰ Bent et al (2007)

³¹ Research Information Network and the Consortium of University Research Libraries [now RLUK] (2007)

³² Research Information Network and the British Library (2009)

³³ CIBER (2008)

³⁴ Research Information Network and the British Library (2009)

³⁵ Research Information Network and the British Library (2009)

³⁶ Research Information Network and the Consortium of University Research Libraries [now RLUK] (2007)

³⁷ Kroll and Forsman (2010)

³⁸ Bent *et al* (2007)

One of the ways Subject Librarians are typically supporting researchers in their information discovery activities is by having a detailed knowledge of information resources in their subject areas and the skills to efficiently find the resources required and, by providing advice and training, to enable researchers to find relevant resources easily. Yet the findings of recent studies into the behaviour of researchers suggest that Subject Librarians will have to work hard to demonstrate that they can add value to researchers' literature searching efforts. The RIN/BL study found for example that the distinctions information professionals make about the status of information resources may not be what matters to researchers whose orientation is primarily pragmatic. Also, some researchers see the training that is available to them as "not specific enough for the kinds of refined resources or utilities they are using"³⁹.

Many libraries report Subject Librarians using traditional means, such as creation of online guides and tutorials to help researchers learn how to use new information resources, and information literacy sessions of various kinds, to support researchers' information discovery needs. But there is evidence that the role of Subject Librarians is being transformed in some libraries to provide more targeted services for researchers, tailored to their specific needs, such as developing effective search strategies, and undertaking literature searches for individual researchers or research teams. The latter vary from small searches, to large pieces of literature-based research, e.g. at Leeds, Subject Librarians undertake literature searches to support systematic reviews, support researchers undertaking literature reviews and provide advice and training on information sources and search methods. Also they will occasionally, as part of a research team, write up the search methodology in the project report.

Several libraries, e.g. Canterbury New Zealand and Cardiff, are providing SDI (selective dissemination of information) and current awareness services to notify researchers of new information resources in their areas of interest. A significant change is the emerging role of synthesising, analysing and/or interpreting the information found from databases and printed sources and presenting these in a digest, report, etc. Cardiff has established a Support Unit for Research Excellence (SURE)⁴⁰ and Information Specialists are building partnerships with researchers to provide many of the types of information support outlined above, both inside and outside of the University.

Underpinning much of the researchers' ability to discover and use information resources (in all formats) is the collection development work undertaken by some Subject Librarians. They play a key role in the purchase of new publications and information resources, are involved in collection policy development, and ensure that collections meet the needs of researchers as well as those of teaching and learning. At

³⁹ Research Information Network and the British Library (2009)

Newcastle they envisage that collection development will become “increasingly selective and evidence-based, closely allied to an understanding of researchers’ workflows”. The RIN/BL study recognises this and says it is “increasingly important, but also increasingly difficult, for libraries to sustain a dynamically-relevant subscriptions portfolio that supports the ever-evolving research programmes pursued in the university as a whole. Hence it is crucial that a lively and continuous dialogue is maintained between researchers and the IIS team. Otherwise, the evidence from our groups is that failure to include in the subscriptions portfolio the specialist journals they need can constitute a real barrier to effective research”⁴¹.

2.3.3 Information management

Researchers have a need to manage, manipulate and present the information, for example bibliographic references, frequently visited websites etc., which they gather during the life of their research project. Kroll and Forsman found that “Researchers report that they struggle unsuccessfully with storage and management of a burgeoning volume of documents and data sets that they need and that result from their work”, and that despite the services designed to help them manage their research data and information “... many researchers flounder in a disorganized and rising accumulation of useful findings that may be lost or unavailable when conducting future research”⁴².

There are many examples of Subject Librarians providing advice and training on information management, and some see the potential to also advise on its manipulation and presentation. One of the most common activities is providing support on citing and referencing, and managing bibliographic references. For example Subject Librarians at Melbourne provide support and training in the use of bibliographic software and, at Leeds, the Library supports researchers in developing “their research information management skills, including the ability to use bibliographic software...and [to] have sound citation and referencing skills ...”

2.3.4 Research data collection

The distinction made here between data and information is that data refers to discrete items, such as numbers or images, without intrinsic meaning, whereas information is analysed and interpreted data. Thus a “piece of data becomes information or knowledge only when it is interpreted by its receiver”⁴³. Research data generation, be it through experiment, observation, simulation, interview, survey, or some

⁴⁰ www.cardiff.ac.uk/insrv/sure

⁴¹ Research Information Network and the British Library (2009)

⁴² Kroll and Forsman (2010)

⁴³ Kock et al (1997)

other means, is a core activity in the research life-cycle and a substantial amount of researchers' time is devoted to it. No discussion was found in the literature to indicate that these activities are generating any information or related needs, although that is not to say that they do not nor will not in the future. Researchers can also have a need to discover pre-existing data that will, for example, complement or augment their own, or be re-purposed in their work.

Perhaps not surprisingly, there was no evidence in the literature or from the participating libraries that Subject Librarians are involved in helping researchers with research data generation. There was however identification of a need for Subject Librarians to have more knowledge of existing datasets, and therefore there is an implicit indication that they could be more heavily engaged in advising and supporting researchers to identify useful and relevant pre-existing data.

2.3.5 Research data discovery, management and curation

Researchers are concerned with a number of important research data management issues such as access, organisation, analysis, storage, combination and re-use, portability, sharing, and data security; in addition they frequently struggle to manage the data (often in huge quantities) that they collect⁴⁴. As the RIN/BL study says, "The sheer volume of data and information that is now being produced, and expected to be produced in the future, is a cause for concern. Researchers fear that there will be too much data to handle, process, or even look at"⁴⁵. Seidel echoes this: "Science is becoming data-intensive and collaborative. Researchers from numerous disciplines need to work together to attack complex problems; openly sharing data will pave the way for researchers to communicate and collaborate more effectively"⁴⁶. *Science* recently made available a special online collection of articles that focus on the challenges and opportunities presented by the "increasingly huge influx of research data"⁴⁷ and the centrality of data collection, curation, and access to these issues. The introduction highlights the fact that most scientific disciplines are finding the research data deluge to be extremely challenging, and that there are tremendous opportunities to be realized if research data can be better organised and accessed. *Science* polled a group of 1,700 international and interdisciplinary scientific leaders about the availability and use of data and found that, "About 20% of the respondents regularly use or analyze data sets exceeding 100 gigabytes, and 7% use data sets exceeding 1 terabyte. About half of those polled store their data only in their laboratories—not an ideal long-term solution. Many bemoaned the lack of common

⁴⁴ James *et al* (2009)

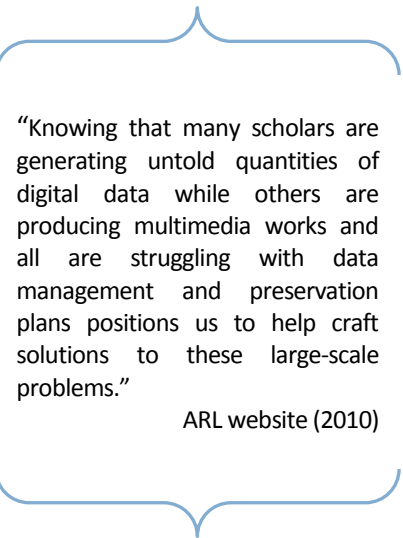
⁴⁵ Research Information Network and the British Library (2009)

⁴⁶ www.nsf.gov/news/news_summ.jsp?cntn_id=116928

⁴⁷ www.sciencemag.org/site/special/data/

metadata and archives as a main impediment to using and storing data, and most of the respondents have no funding to support archiving."

These concerns are being heightened because many major funding bodies, for example, The Wellcome Trust, the UK Research Councils, and the National Science Foundation in the USA are beginning to require researchers to develop and implement research data management plans to help to ensure data is not lost, and to make the data available and accessible to third parties beyond the life of the project. It is interesting to note, however, that the RIN/BL study as recently as 2009 found little evidence among the cohort of scientists involved that "planned data management has yet been adopted as standard practice"⁴⁸.



"Knowing that many scholars are generating untold quantities of digital data while others are producing multimedia works and all are struggling with data management and preservation plans positions us to help craft solutions to these large-scale problems."

ARL website (2010)

The services to support the management of research data are still to a certain extent in their infancy, and their nature and who should provide them are questions being actively debated. For example, a Panel at the recent European Conference on Research and Advanced Technology for Digital Libraries (ECDL) explored the services that might close the gap between "digital library systems and researchers' current practice for managing data and ... appropriate services that can help to bridge it"⁴⁹. Similarly a public symposium sponsored by the Board on Research Data and Information of the National Research Council discussed the roles of libraries in the management and support of research data activities⁵⁰. A report from the Digital Curation Centre's SCARP⁵¹ investigation highlighted the diverse forms of data that researchers produce and curate, and that Subject Librarians will need to understand in order to provide appropriate support and services. The RIN/BL report picks up on these findings and says "meeting the diverse curation requirements of a wide range of research groups would pose a formidable challenge...especially if such requirements were to translate into a demand for support from a central cohort of data management experts who were also expected to display a substantial level of subject knowledge"⁵². A recent report commissioned by the Association for Research Libraries (ARL)⁵³, based on information from 57 of their member libraries, explores the role of libraries in supporting e-science activities. The report provides

⁴⁸ Research Information Network and the British Library (2009)

⁴⁹ www.ecdl2010.org/?page_id=556

⁵⁰ Board on Research Data and Information (2010)

⁵¹ Key Perspectives Ltd (2010)

⁵² Research Information Network and the British Library (2009)

⁵³ Soehner *et al* (2010)

information about how libraries are supporting the management of research data and their strategies for resourcing services.

In some high profile research programmes fields, for example genomics and proteomics, sharing data is well developed and has “come to be seen as something of a paradigm or model around which policies and practice will converge”⁵⁴. However researchers also express some unease about sharing, for example about potential misuse, ethical constraints, security, with respect to sharing both information and data. Subject Librarians engaged in providing advice and support for data management will need to be aware of these apprehensions and be able to provide convincing reassurances.

There are several examples from the participating libraries of Subject Librarians becoming involved with research data curation and management, for example at Newcastle, Canterbury NZ , Southampton with support from a JISC funded project , and Leeds where Subject Librarians are occasionally part of research teams and could be managing data. At Maryland, Subject Librarians are beginning to have a new and growing role with respect to advice and referral regarding research data management, and they train researchers on the use of particular data management systems, such as Geographic Information Systems (GIS). Gabridge⁵⁵ argues that there is a long tradition of Subject Librarians supporting research data curation for the social sciences and GIS data. She describes how at MIT this role is being extended to engineering and science data, and identifies the following as some of the activities which Subject Librarians can engage:

- Determining the best home for data, and the manipulation required to make it reusable by others;
- Consulting with researchers at the point of data creation and advising on standards applicable to their need, assisting with the compilation of a data management plan, and creating “organizing strategies for documentation, files, backups and more”;
- Collecting and making available data sets for reuse.

Gabridge recognises that “At first glance it may appear that adding data liaison services on top of an already full service portfolio at a university library system is too much to ask right now”. But she argues that services like these are a major component of libraries’ future, and that ensuring the collection of the complex research and that it can be reused by others is central to their ongoing mission. But, she argues, “To play a credible role in data curation, librarians must overcome significant challenges...To demonstrate

⁵⁴ Research Information Network and the British Library (2009)

⁵⁵ Gabridge (2009)

that libraries can provide the right data curation solutions for both research institutions and individual researchers, libraries will need to attack the problem from both ends”⁵⁶.

Heidorn⁵⁷ identifies a particular role for libraries in disseminating and preserving ‘dark data’, i.e. data that is “not carefully indexed and stored so it becomes nearly invisible to scientists and other potential users’ and which can be ‘critical to scientific progress”. As part of a research project funded by the Institute of Museum and Library Services, Purdue, in association with the University of Illinois have developed the Data Curation Profile⁵⁸, a tool to assist in discussing research data, workflow, needs and sharing requirements. They anticipate that this will facilitate deeper conversations about research, but with a focus on data; provide insight into current research practices; assist in identifying (and possibly inventorying) data needs; and aid in the eventual selection and/or collection management of locally produced research outputs.

Connaway and Dickey⁵⁹ found that researchers want to have accurate metadata associated with their publications and documents, and this is true for research data too. They feel they have insufficient time to provide accurate metadata themselves, and would like more accurate and consistent processes for adding it. Metadata standards are increasingly being developed for more and more disciplinary data types⁶⁰.

There is evidence that Subject Librarians are increasingly involved in supporting researchers to improve the discoverability of both their research data and their publications by the provision of accurate and comprehensive metadata of all kinds, not just bibliographic. At Purdue instruction in the use of a metadata schema to better promote research outputs is one of the new areas that Subject Librarians are exploring, and indeed they are engaging at a level that goes beyond hits. They have, for example, developed a metadata schema to provide “tags” for researchers to enter content on a web portal. Similarly, at Liverpool, Subject Librarians have traditionally discussed discovery and library resources with researchers but are finding a pressing need to provide them with support in the management, manipulation and presentation of information, including metadata.

⁵⁶ Gabridge (2009)

⁵⁷ Heidorn (2008)

⁵⁸ www.datacurationprofiles.org

⁵⁹ Connaway and Dickey (2009)

⁶⁰ www.ecdl2010.org/?page_id=556

2.3.6 Sharing, discussion, online collaboration

With certain caveats, researchers' want to share ideas, and to discuss and network with colleagues⁶¹. The RIN/BL study found that "although sharing and exchanging information of many kinds is central to the ethos of life science research, individual researchers wish to choose what to share, with whom, and when"⁶². This is echoed in the James *et al* investigation who found that ECRs need support and are members of many, often overlapping, sometime redundant, networks and communication channels and technologies, yet they also have a need for trust and physically proximate relationships currently dominate⁶³. They concluded that online scholarly networking might support the ECR's need, especially at a time when travel funding is restricted. However, they also found that 72% of ECRs do not use Web 2.0 or social media to share their research, and the chief barrier to use is their lack of awareness of what is available^{64,65,66}.

Warwick has created a physical space for researchers, the Wolfson Research Exchange⁶⁷. There may be an opportunity here for Subject Librarians to provide an advisory role in identifying and promoting virtual networking forums, and indeed in developing them, especially for niche research areas not currently catered for elsewhere⁶⁸. At Leeds, for example, the Library aims to support and develop researchers to enable them to use online resources to promote their work and raise their profile, and at Newcastle they see a main strand of activity being supporting the use of research communication and collaboration tools.

2.3.7 Analysing and reflecting on information and research data

This important phase of the research life cycle is another which is core to the research process but one where no information was found in the literature consulted about any information and related needs of researchers during this phase. Data mining is a powerful technique that uses advanced computer analysis to uncover patterns and trends, often unexpected, within data⁶⁹. Polfreman *et al* suggest that data

⁶¹ Connaway and Dickey (2009)

⁶² Research Information Network and the British Library (2009)

⁶³ James *et al* (2009)

⁶⁴ www.jisc.ac.uk/media/documents/publications/inform/2010/inform28.pdf

⁶⁵ British Library and JISC (2009b)

⁶⁶ James *et al* (2009)

⁶⁷ www2.warwick.ac.uk/services/library/researchexchange

⁶⁸ Cervone (2010)

⁶⁹ www.jisc.ac.uk/whatwedo/topics/datatextmining.aspx

mining, and its counterpart text mining, may “inhabit a grey area between resource discovery and the unearthing of new knowledge”⁷⁰.

Two participating libraries, and the literature, do however refer to data mining as an activity that libraries and Subject Librarians might be involved with in the future. Canterbury New Zealand hope that Subject Librarians might be active in data mining in the future, and also mention the potential need for skills in text mining; Cardiff also see a potential need for skills in data mining techniques.

2.3.8 Writing up and dissemination

Disseminating the results of a piece of research, be it through writing a thesis, journal article, research report, conference paper, report of a performance, or a blog, is clearly a major and important part of the research life cycle⁷¹. The phrase ‘publish or perish’ still has meaning, and research assessment processes make heavy use of publication counts, especially of journal articles. A chief concern of ECRs is where to publish⁷². As the RIN/BL report commented, “These public activities have strong institutional and professional incentives in building reputations, securing promotion and so on. Incentives for other kinds of communication and sharing are weaker and indirect”⁷³.

A report commissioned by RIN and JISC⁷⁴ looked at how and why UK researchers publish and disseminate their findings. On the one hand they are encouraged towards the widest dissemination of their research, and on the other to publish in peer review journals with sometimes limited audiences. The choice of channels is seemingly endless, as are the relative merits such as speed, audience, and peer esteem, and the report highlights the confusion felt by researchers about which they might use to best effect⁷⁵. One conclusion of the report is that changes in dissemination and publishing mechanisms need to be based on “a detailed understanding of both the behaviours and the motivations of researchers across the full range of disciplines and subjects”⁷⁶. The earlier RIN/CURL⁷⁷ study also found that researchers’ awareness of new developments in scholarly

⁷⁰ Polfreman *et al* (2008)

⁷¹ James *et al* (2009)

⁷² James *et al* (2009)

⁷³ Research Information Network and the British Library (2009)

⁷⁴ Research Information Network and the Joint Information Systems Committee (2009)

⁷⁵ Although monographs and edited volumes in the humanities, and practice-based outputs in the performing arts, are still dominant.

⁷⁶ Research Information Network and the Joint Information Systems Committee (2009)

⁷⁷ Research Information Network and the Consortium of University Research Libraries [now RLUK] (2007)

communication, such as open access, was low. This is echoed in Connaway and Dickey's⁷⁸ finding of a low level of awareness of institutional repositories by researchers and the need to promote their use and value in generating greater exposure and potentially more citations and impact; researchers want to see a need to use repositories before they embed them in their workflow. They also want "to know who is going to use the information or data they deposit and for what purpose" and "while they may see depositing publications as a means to improve dissemination of research results, they are concerned that mandates to deposit research data in institutional repositories will require safeguards significantly stronger than those provided for publications"⁷⁹. The SOAP Project, funded by the European Commission, has recently published the results of a survey to assess researchers' experiences with, and attitude to, open access publishing⁸⁰.

Several participating libraries report that Subject Librarians already are, or will be, advising and/or training researchers on dissemination and publishing options, including scholarly communication and open access. They are supporting faculty in understanding and/or utilising new and different dissemination means, helping them to understand open access as sustainable models of scholarly communication. For example, at John Rylands Manchester they expect to offer training that will increase researchers' knowledge of, and skills in, scholarly communications. At Minnesota they have been reinventing their Subject Librarian model - redefining traditional roles and integrating new roles. One of the new areas of activity they have incorporated is informing faculty, graduate students, and administrators about scholarly communication issues. They promote sustainable models of scholarly communication, assist in the development and creation of tools and services to facilitate scholarly communication, and recruit content for the institutional repository⁸¹. The Library at Liverpool manages a central open access fund paying open access fees, and Subject Librarians advise researchers on complying with open access publishing issues.

ARL reports that "some libraries have begun to use the repository infrastructure to provide publishing, data curation and a broader set of scholarly communication services that fulfil real needs of their users. The focus is no longer primarily on getting content into the repositories but how that infrastructure—often in conjunction with other tools—can support a broad range of scholarly activities"⁸².

Examples of Subject Librarians giving advice and support in using institutional repositories are relatively common. At Hong Kong University, for example, Subject Librarians have begun to assume liaison

⁷⁸ Connaway and Dickey (2009)

⁷⁹ Research Information Network and the British Library (2009)

⁸⁰ <http://project-soap.eu/soap-survey-released-your-views-on-open-access-publishing-are-needed/>

⁸¹ Williams (2009)

responsibilities to advocate scholarly communication initiatives, such as the local institutional repository, and to communicate policies and procedures. At Leeds the Library aims to support and develop researchers to enable them to have an understanding of open access publishing options and to share their research findings and disseminate research outputs through use of the University's publications' database, White Rose Research Online (a shared, open access repository for the Universities of Leeds, Sheffield and York), and White Rose e-Theses Online. Subject Librarians at Southampton will also be contributing to giving research students support for depositing e-theses. Some libraries report that they are anticipating that their Subject Librarians will become more involved in these areas in the future. For example, Northumbria are planning to help researchers ensure their work is disseminated "broadly, quickly, and openly, getting maximum impact for researcher and the University". Canterbury NZ want to do more to encourage further open scholarly communication, and the sharing of research outputs, and Sydney are moving to supporting academics to house their research output in a sustainable and future-proof way.

Subject librarians also support researchers in complying with the various open access mandates of funding bodies such as The Wellcome Trust. At Purdue, Subject Librarians are beginning to explore new ways to support researchers, for example identifying alternative repositories for research data to meet journal submission requirements, and at Leeds Subject Librarians are occasionally part of a research team and may co-author publications. OCLC is currently examining researcher dissemination behaviours in "venues other than the traditional forms of scholarly publication, academic journals and monographs", and expects to identify new support roles for Subject Librarians that "researchers should like because they can make their work easier and help them in maintaining their scholarly reputation"⁸³.

2.3.9 Compliance, intellectual property, copyright and other statutory requirements

As well as needing to understand and comply with funders' mandates, researchers comply with a number of legal and other requirements both as authors and publishers, such as intellectual property rights, data protection, and copyright. The literature suggests that researchers exhibit uncertainty and lack confidence in these areas; Connaway and Dickey⁸⁴ for example identified a lack of understanding among researchers of the need to understand the copyright agreements they made with publishers.

⁸² www.arl.org/rtl/plan/nrnt/nrtrepos.shtml

⁸³ www.oclc.org/research/activities/desirability/default.htm

⁸⁴ Connaway and Dickey (2009)

At Melbourne they recognise that one of the drivers for research support is the “increasing complexity of compliance conditions including copyright, funding conditions around research data management and government quality assurance programs ...”. This presents opportunities for the Library to provide specialist assistance with these tasks. Subject Librarians there and elsewhere, for example Leeds and Tilburg, help researchers to understand issues relating to the ethical use of information, such as copyright, intellectual property, and plagiarism. At Liverpool, as well as advising on these issues, they also offer advice to researchers on complying with funders’ mandates in these areas.

2.3.10 Preservation

ARL distinguishes between digital curation, i.e. “actions that maintain and add value to digital information over its lifecycle” and digital preservation which “focuses on the actions taken to ensure the accessibility of digital information across time and new technologies”⁸⁵. They draw attention to the “myriad forms of born-digital information objects” that are being created, for example user-generated Web content, digital research data, digital notes, and electronic records. Funders, for example, the National Academy of Sciences⁸⁶ are beginning to consider requirements, not just for research data management but also for research data preservation or stewardship. Goldstein and Ratliff maintain that “It is now abundantly clear that researchers must consider the preservation and sharing of their data as a key component of any research effort”⁸⁷. A report commissioned by the JISC highlights the long-term benefits for researchers in preserving research data⁸⁸.

Limited evidence emerged of Subject Librarians supporting researchers in the long-term preservation of their research data or project records, and where it was mentioned it was seen as something for the future. For example, Canterbury NZ envisage more support for preserving primary research data, and Durham foresee potential involvement in research data preservation. They note that to date, “most developments on institutional repositories have related to the preservation of final outputs (articles, theses etc.) but there is increasing recognition (both locally and nationally) that the research data behind these outputs are just as valuable”. In 2010 CNI (Coalition of Networked Information) ran a session called “NSF Data Management Plan Requirements: Institutional Initiatives” which contains an interesting

⁸⁵ www.arl.org/rtl/plan/nrnt/digipres.shtml

⁸⁶ National Academy of Sciences (2009)

⁸⁷ Goldstein and Ratliff (2010)

⁸⁸ Beagrie *et al* (2008)

discussion⁸⁹ about these requirements and in particular the response being made by Purdue, including the Library.

2.3.11 Quality assessment and measuring impact

There is a growing need for university researchers to demonstrate the impact of their work. James *et al*⁹⁰ describe it this way: “In past times the degree of ... respect was considered sufficient for the evaluation of researchers’ professional abilities, but as fields have grown beyond the scale of personal networks, and as funding bodies have demanded measures of ‘value for money’, academia has sought objective evaluations of research quality.” There are national initiatives too which look at the value of research activity in universities. In Australia, the Excellence in Research for Australia (ERA) assesses research quality within higher education institutions⁹¹, and in the UK the Research Excellence Framework (REF), a process of expert review, will be used to assess the quality of research and its outputs, the wider impact of research, and the vitality of the research environment in higher education institutions in 2014⁹². The REF is replacing the earlier Research Assessment Exercise (RAE). Increasingly a number of instruments are being used to measure impact and output quality, not just for these national quality audits but also for use in grant applications, obtaining prestigious awards, promotion etc.^{93,94}. These instruments often involve information about publications and citations in peer-reviewed journals.

This is an area where Subject Librarians are becoming increasingly involved. At Cardiff and Leeds, for example, they gave support to researchers during the RAE and will continue to do so for the REF. At Sydney, they are moving towards assisting their academics to maximise the exposure of their research output (assisting them with research factors etc.), and the ranking of research outputs. Several libraries report providing, or anticipate providing, advice on bibliometrics (e.g. citation scores, publication counts, the H-index) and impact factors, for example Canterbury NZ, Hong Kong, Leeds, Newcastle and Trinity College Dublin. At Liverpool they are investigating the information needs of research managers and leaders and have a project to integrate the Institutional Repository with the Current Research Information System to help to meet these, for example by presenting publication data alongside contextual data such as citations, impact factor and journal. Two recent reports commissioned for OCLC have provided further

⁸⁹ www.cni.org/tfms/2010b.fall/Abstracts/PB-nsf-goldstein.html or www.youtube.com/cnivideo or <http://vimeo.com/channels/cni>

⁹⁰ James *et al* (2009)

⁹¹ www.arc.gov.au/era/default.htm

⁹² www.hefce.ac.uk/research/ref/impact/

⁹³ Delasalle (2010)

⁹⁴ Tynan and Garbet (2007)

examples of the role research libraries are playing in the higher education research assessment regimes in five countries^{95,96}.

2.3.12 Commercialisation

Little discussion was found about the commercialisation of research outputs and so-called 'third strand' activities⁹⁷, and any information needs researchers have related to these, although Bent et al⁹⁸ do refer to it in their discussion of the 'expert' age of research. This absence of comment was reflected in the responses from libraries which also made minimal, if any, mention of support for this type of activity. Toronto reports that some of their Subject Librarians who are "embedded" and working directly with science faculty at non-library sites are involved in commercialisation through market research. One area where Subject Librarians could offer support for commercialisation is highlighted in an OCLC report⁹⁹ which points out the need for researchers to pay attention to copyright and other mechanisms for preserving intellectual property rights in this context.

2.3.13 Emerging technology

Researchers now have the opportunity to use a wide range of emerging technologies, including grid technology, haptic technology, the semantic web, MP3 players, Web 2.0 applications, text messaging, mobile/phone devices, presentation software, podcasting, and handheld devices e.g. the iPad. Much of this technology, especially at the 'high' end, such as grid technology, is having a profound effect on the nature of research and the research process. However the use of some of these new technologies may not be as pervasive as might be envisaged. For example, a recent RIN report¹⁰⁰ explored the adoption of Web 2.0 tools and services and found support for them among researchers but relatively low use. The report argues that, there is little evidence to suggest that Web 2.0 services will generate "radical changes in scholarly communications" and that it is most likely that they will continue merely as "supplements to established channels of communication between researchers".

There is an opportunity for Subject Librarians to introduce researchers to the potential of some of these emerging technologies. The British Library has recently launched an exhibition, Growing Knowledge¹⁰¹,

⁹⁵ Key Perspectives Ltd (2009)

⁹⁶ MacColl (2010)

⁹⁷ www.hefce.ac.uk/pubs/hefce/2000/00_05.htm

⁹⁸ Bent et al (2007)

⁹⁹ Kroll and Forsman (2010)

¹⁰⁰ Research Information Network (2010)

¹⁰¹ www.growingknowledge.bl.uk/Default.aspx

which gives researchers' an opportunity to "interact with never-seen-before tools, thought-provoking content and futuristic design"¹⁰² in a new digital environment. It is expected that the exhibition will provide clues to both how research is changing and also to what researchers want to experience from the library of the future. One part of the exhibition, in partnership with BBC, will explore whether social media tools and online networking support researchers in their work. The nature and potential of some of these technologies, especially Web 2.0 tools, are frequently covered in the information literacy programmes for researchers run by libraries, and many libraries are considering how best to exploit mobile technologies. Many Subject Librarians are engaged in promoting the use of Web 2.0 tools for both information management and networking, however the participating libraries did not highlight this area as one in which their subject librarians are heavily engaged, although the need for awareness and skills in this area was regularly indicated.

2.4 Commentary

Researchers have diverse information and related needs depending, for example, on their discipline and the stage of their career. To most effectively provide the support and services needed to meet these needs Subject Librarians must have a deep understanding of what they are – one size does not fit all. They will need to keep abreast of the findings of ongoing investigations into researcher behaviour and respond accordingly, not by trying to restrain and mould researcher behaviour to the old modes of service and support, but by embracing the new ways and designing innovative and responsive approaches. As the CIBER report says "the future is now, not ten years away, and [research libraries] have no option but to understand and design systems around the actual behaviour of today's virtual scholar"¹⁰³. The RIN/BL report supports this: "The challenge for institutional information services is thus to develop and provide online services geared to the needs of their research groups and thereby to add value to the research process, facilitating the use of new tools, providing individuated professional support, as well as advice, training and documentation on a subject or discipline basis"¹⁰⁴.

It is essential that researchers understand and begin to address data and information description, management and curation issues at an early stage in their research to ensure maximum efficiency and effectiveness. For example details of provenance and effective indexing as information and research data are collected will make retrieval, curation and storage much easier in the long-term. There is a clear support role here for Subject Librarians.

¹⁰² www.jisc.ac.uk/news/stories/2010/10/growingknowledge.aspx

To date, Subject Librarians have supported the needs of researchers through relatively traditional services revolving around information discovery, collection development and some elements of information management. The survey of participating libraries and the literature provide evidence for a shift in the nature of support and services, which are becoming more diverse and extensive, and moving beyond purely information-related activities and towards a greater emphasis on research data management in particular. They recognise the importance of the research agenda to their institutions and of giving it appropriate and relevant support, and a range of new roles for Subject Librarians are being explored and embedded. What is critical is that the people performing the roles are ready and willing to accept the challenge and have the opportunities to develop and practice the new skills they will need to meet it.

¹⁰³ CIBER (2008)

¹⁰⁴ Research Information Network and the British Library (2009)

3 Skills and knowledge

To support the information and related needs of researchers expertly, now and in the future, and to perform the roles identified in Chapter 2, Subject Librarians will need to have a set of skills and knowledge, and be able to apply these appropriately. In this context skills refers to the “ability acquired through the deliberate, systematic, and sustained effort to smoothly and adaptively carry out complex activities or job functions involving ideas (cognitive skills), things (technical skills), and/or people (interpersonal skills)”¹⁰⁵. Knowledge refers to professional, technical, subject and other information that individuals gain through education and experience.

A potential set of skills and knowledge needed by Subject Librarians was extrapolated from the information gathered about their current and potential future role, the literature, and survey responses. The participating libraries provided a wealth of information about the skills their Subject Librarians and other relevant staff require. As well as listing the skills and knowledge required to support researchers specifically, they also recorded a ‘long tail’ of equally important skills and knowledge that are more generally required by Subject Librarians, including for example: communications skills of a high order; strong interpersonal and team working skills, including the ability to work collaboratively; financial skills; workload planning and prioritisation; and influencing skills. The Maryland respondent commented that “These core skills are unlikely to change in the future as they are intrinsic to the profession of librarianship. Skills will change as the disciplines change, but those changes cannot be anticipated”. The respondent from Liverpool believes the most important skill or attribute staff can have is an adaptable and flexible approach to work.

So, initially, a very long list of skills and knowledge was generated. In consultation with the Steering Group it was agreed to focus on the skills and knowledge required to support researchers specifically, and to strip out most of the core basic skills, and the skills related specifically to learning and teaching support. This still left a list of 32 items. It was decided to retain the level of granularity of the list, rather than create fewer and more general questions, and to take the opportunity to collect some rich data and maximise the value of the returns to the skills gap survey (see Section 3.2). A final draft list of skills and knowledge was validated and refined by the Project Director and some of his Subject Librarians.

¹⁰⁵ [Business dictionary.com](https://www.businessdictionary.com/definition/skill.html)

3.1 The skills and knowledge set

The final list of 32 potential skills and knowledge areas that Subject Librarians may need to have, is set out below. Quotes illustrate some of the examples provided by managers in the participating libraries and which are encapsulated in each of the items:

Related to the subject/discipline

1. Deep knowledge of their discipline/subject

"...understand and apply the vocabulary, the taxonomy"

"In-depth subject expertise and proven experience to add value for researchers"

"An advanced degree gives the librarian familiarity with not only the subject matter, but also with the history of the discipline, the culture of its researchers, important trends and changes in that discipline, etc.."

"Need to know something about the subject and relevant resources but not possible to have in-depth knowledge – too many subjects to cover"

"We have also introduced a desk-side coaching service which implies upskilling in terms of understanding of subject requirements"

2. Excellent knowledge of content (in all relevant media) available to their discipline/subject

"Required skills include a thorough knowledge of relevant information resources"

"Knowledge of important information resources in the subject area and ability to use them (or learn to use them) as needed"

"A good knowledge of the range of resources available and an acquaintance with the topic, though an in-depth knowledge impossible unless it was one's own UG discipline"

3. Excellent knowledge of bibliographic and other finding tools in the discipline/subject

4. Knowledge to advise on relevant archive and special collections locally and elsewhere

Related to the research process

5. Awareness of current and changing local research interests

6. Understanding of a typical researcher's experience, including their workflow, and how researchers access and use information, within a discipline/subject and at different stages of the researcher's career

"Awareness of the whole research process from grant applications through to publications"

"The important thing is to understand the discipline, have a sense of its history, and understand the underlying structure of research tools. Many changes that seem disruptive or revolutionary at first are really unimpressive when one understands how information works"

"The 'new' skills we need them to possess include an understanding of the research lifecycle and how researchers work"

"... they need a deep understanding of the research process (rather than the subject itself) together with an empathy for understanding the information needs of researchers – which may or may not be at a level commensurate with their research level"

7. Ability to gain an appreciation of individual researcher/project needs, including effective listening skills
8. Knowledge of sources of research funding to assist researchers to identify potential funders

“Accessing funding databases and teaching researchers how to use them to locate funding sources”

Related to partnerships

9. Skills to build strong relationships with researchers and other campus professionals, and to establish collaborative partnerships externally, and to manage client relationships

“Librarians may find it useful to have some consulting skills. The great majority of researchers do not come to the Library frequently and librarians now need strategies in place for approaching researchers in their own domains”

10. Awareness and ability to recognise the value of services and opportunities provided by national and international collaborative initiatives and agencies such as UKRR, RIN, and RLUK
11. Skills to participate effectively in research projects, including identifying a role for the library in the project, and assisting with bid and report writing
12. Ability to pro-actively advise and market appropriate library services to researchers

Related to information

13. Outstanding skills in information discovery, literature searching etc.

“...understanding search strategies and being able to apply and adapt them for various disciplines”

“Outstanding skills in information discovery”

“Providing guidance and sharing knowledge and skills to undertake literature searches”

14. Ability to synthesise, analyse and provide digests of, ‘discovered’ information

“Filtering information and advising on best starting points for research”

15. Knowledge to advise on the management of researchers' information, including its portability particularly for bibliographic management and referencing tools e.g. EndNote

“... subject librarians should be aware of a range of options for managing and re-using references and citations and not just institutionally supported one”

16. Knowledge to advise on the manipulation and presentation of researchers' information

17. Knowledge to advise on citing and referencing, and the use of bibliographic management software

Related to research data

18. Good knowledge of data sources available in the discipline/subject

“An understanding of primary data sources”

“Subject librarians need to keep up-to-date/be familiar with the types of datasets used by researchers in their discipline”

19. Knowledge to advise on data management and curation, including ingest, discovery, access, dissemination, preservation, and portability

"...assistance with the archiving of research data"

20. Knowledge to advise on potential data manipulation tools used in the discipline/subject

"Need to focus more...data handling, data management, development and use of research tools"

"They will also need to have better IT skills to enable them to pick up and adapt tools and to assist researchers to manage and manipulate their data. For example, subject librarians in areas where it is used should know how to use SPSS, medical and health librarians need an understanding of statistics"

"To provide such support, some of the skills require knowledge of statistical tools used by researchers"

21. Knowledge to advise on data mining

Related to information literacy

22. Excellent skills to design information literacy training (both face to face and online) to meet the identified needs of different types of researchers"

"The skills we require our subject librarians to have when we recruit them include: Teachings skills, (qualification preferred)"

"Knowledge and experience in teaching with effective adult learning techniques"

Related to scholarly communications

23. Ability to advise on current trends, best practice and available options in research publication and dissemination methods and models nationally and internationally, including scholarly communication and open-access publishing

"An understanding of open access publishing"

"... publication targeting"

"helping to understand open access as sustainable models of scholarly communication"

"Their skills will lie in enabling researchers to 'join up' their research with ways in which it is going to be cited and used, so skills in helping them upload outputs into repositories"

"We are building capacity in terms of some core skills relating to the publishing environment"

24. Ability to advise on preserving research outputs

25. Ability to advise on the preservation of project records e.g. correspondence

Related to funders' mandates, assessment, and other 'legal' requirements

26. Sufficient knowledge to support researchers in complying with the various mandates of funders, including open access requirements

27. Understanding of the national and local research assessment processes, and the requirements of the REF

"Awareness of the requirements of REF, funding bodies and other relevant research issues"

"They will also need to understand the REF and how bibliometrics and impact factors will be used"

28. Understanding of research impact factors and performance indicators and how they will be used in the REF, and ability to advise on citation analysis, bibliometrics, etc.

"They will also need to understand how bibliometrics and impact factors will be used"

"... able to work in partnership with researchers so that they know what to do with their research outputs and how to make them count"

29. Understanding of author rights, copyright legislation and IP issues, and plagiarism to advise or refer as appropriate

Related to metadata

30. Knowledge to advocate, and advise on, the use of metadata

"Expertise in areas such as metadata will continue to develop"

"Creating and editing metadata records for data collection"

"Conduct information sessions about benefits of exposing public metadata about research data and collections and the link to publications"

"... broadly based professional knowledge of metadata"

"...we are increasingly likely to be asked about other issues such as ... metadata..."

31. Skills to develop metadata schema, and advise on discipline/subject standards and practices, for individual research projects

"Delivery of introductory information sessions about research data registration metadata requirements"

Related to emerging and Web 2.0 technologies

32. Ability to advise on the value and use of mobile technologies, Web 2.0 and other communication tools (e.g. Mendeley, Virtual Research Environment) to researchers

"Expertise in new technologies including social media"

"Subject librarians may need to develop some technical skills, e.g., experience with various devices that our patrons use (such as handheld devices) and various tools to help link users with information (such as RSS feeds and other emerging 'Web 2.0' technologies)"

3.2 The skills gap survey

As mentioned in Section 1.3, Subject Librarians and their managers in RLUK member libraries were invited to participate in a web-based survey designed to validate the skills and knowledge identified by assessing their relative importance, and to assess the extent to which Subject Librarians currently have these skills and how important they felt they would be in the future. The survey was completed by 169 members of staff from 22 institutions. The breakdown of the roles of the respondents is shown in Diagram 1. The 'other' category includes a Researcher Training Librarian, a Research Development Librarian, a Research Skills and Development Librarian, a Project Manager, and some Information Assistants or equivalent.

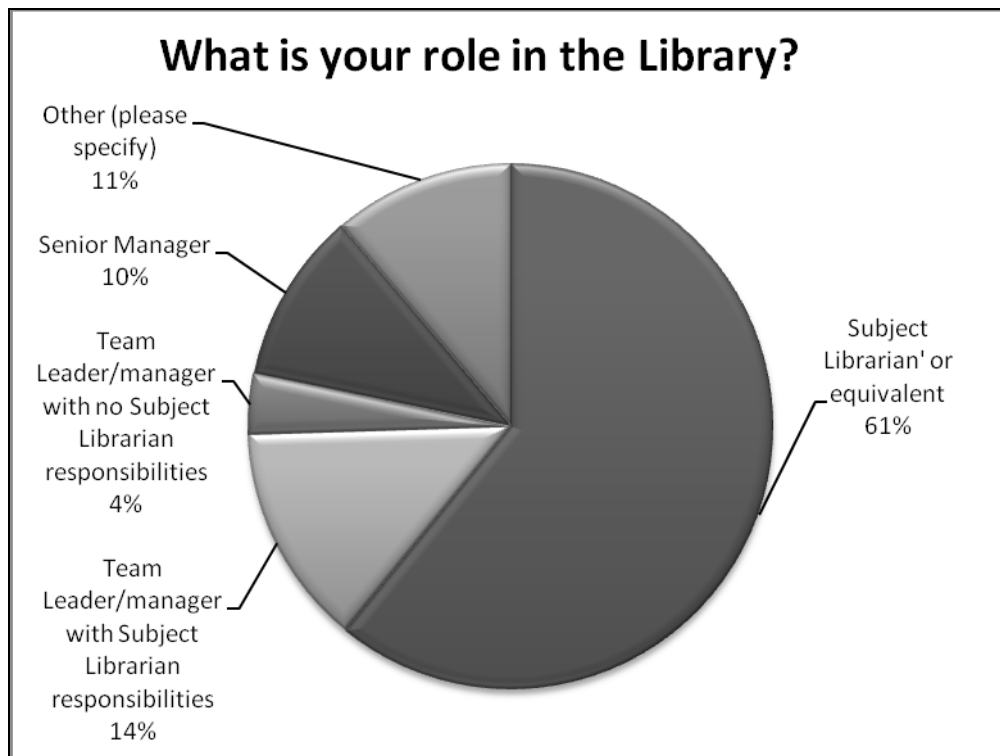


Diagram 1

3.3 Validation of the set of skills and knowledge

In the skills gap survey all respondents were asked to rate how necessary it is, or will be, for Subject Librarians in their context, to have the skills and knowledge on the above list both now and in the future. The respondents confirmed the necessity of the skills and knowledge identified and assessed the relative importance of each one (see Table 1, page 100).

Nine skills and knowledge areas were identified as being essential now and of continuing or growing importance over the next 2 – 5 years, by the majority of respondents.

- Excellent knowledge of **bibliographic and other finding tools** in the discipline/subject
- Excellent skills to **design information literacy training** (both face to face and online) to meet the identified needs of different types of researchers
- Outstanding skills in **information discovery**, literature searching etc.
- Knowledge to advise on **citing and referencing, and the use of bibliographic management software**
- Ability to pro-actively **advise on and market appropriate library services** to researchers
- Good knowledge of **data sources** available in the discipline/subject
- Excellent knowledge of **content** available in the discipline/subject
- Awareness of current and changing **local research interests**
- Ability to gain an appreciation of **individual researcher/project needs**, including effective listening skills

All of the remaining skills and knowledge areas were considered by the majority of respondents to be at least desirable, if not essential, currently. In all but one of these they were also seen as becoming more essential over the next 2 – 5 years by a large proportion of people.

The one area where people do not foresee a significantly greater need in the future is a deep knowledge of their discipline or subject. 24% of respondents see this area as essential now and 55% as desirable; 28% see it as essential in the next 2 – 5 years and 48% as desirable.

The requirement for Subject Librarians, in their many guises, to have a deep knowledge of their subject is perhaps one of the most controversial skills areas. It could be seen to be a return to the old 'scholar librarian' paradigm which lost favour around the 1980s. However, advocates for deep subject knowledge, in the context of support for researchers, see it as a key requirement. The University of Melbourne for example expects Subject Librarians to have discipline knowledge and a discipline background. They argue that "In order to improve our capacity for supporting high-level research, the Library is now actively pursuing a recruitment policy to attract subject librarians who have a background in the related discipline. Hence where possible, we aim to recruit librarians who have degrees in the area of liaison coupled with postgraduate qualifications in librarianship. Of course, this is not always possible but it is our preferred policy". As a supplement to recruitment, they have also initiated an annual professional cadetship programme, recruiting two students enrolled in Masters Degrees courses in Librarianship, who also have subject degrees. Both Liverpool and Manchester John Rylands require candidates for Subject Librarian posts to have degree in a relevant subject, or, in the case of Liverpool, experience of support in at least one of the subjects they will be working with.

Gabridge comments on what she calls the 'long-standing' debate, in the context of engineering and science, as to "whether it is more important for engineering and science data curation liaisons to have domain expertise or information science expertise". Her conclusion is that they must have both. She argues, "To create data liaisons with this combination of skills libraries can develop existing liaisons with interest, passion, and strong analytical skills; or they can recruit domain experts, and teach them about excellent information science practices"¹⁰⁶. One of the Subject Librarian respondents raises another issue about the labour market, "Very few librarians are likely to have specialist science or medical knowledge - if you train as a research scientist or medic, you probably won't become a librarian". They go on to say "You find out what you need to know and apply this in terms of demonstrating subject searches and learning

¹⁰⁶ Gabridge (2009)

about key words, subject headings, terminology to use, etc. The researchers have the subject knowledge - the librarian works with them to find the best databases (etc.) to search and how to construct a search strategy, then how to manage the results and search histories”.

The majority of the respondents did not consider any of the skills and knowledge areas to be unnecessary, either now or in the future. The areas where there appears to be some doubt about their necessity in the future (i.e. 20% or more respondents thought they will be unnecessary) are:

- Knowledge of **sources of research funding** to assist researchers to identify potential funders (30%)
- **Deep knowledge of their discipline/subject** (24%)
- Ability to **synthesise, analyse and provide digests of, ‘discovered’ information** (24%)
- Ability to advise on **the preservation of project records** e.g. correspondence (20%)

Although in the past the identification of sources of grants and funding may have been something which librarians assisted with as part of the enquiry service, it is perhaps understandable that this knowledge is not considered necessary for Subject Librarians in today's environment where research offices and research administrators are commonplace. The last point may be explained by the assumption that this knowledge is held by archivists and special collections librarians, and that advisory services in this area are their preserve. More surprising, and possibly in need of challenging, is the belief that the ability to synthesise, analyse and provide digests of, ‘discovered’ information may not be a necessary skill for Subject Librarians, when it could be argued that this kind of service is precisely where researchers and the institution might look for added value from them. However, while desirable there is likely to be an issue here of scalability and the capacity of Subject Librarians to offer such services.

3.4 Gaps in Subject Librarians’ skills and knowledge


As explained in Section 1.3, two sources of information were used to identify any gaps in the skills and knowledge Subject Librarians have to enable them to support researchers effectively: the survey of participating libraries and the skills gap survey sent to RLUK members.

3.4.1 Findings from the survey of participating libraries

Training and development needs, or the need for staff to stay up-to-date, in most of the skills and knowledge areas, were identified to some extent or another by participating libraries. None of them reported any recent analysis of the current training and development needs of their Subject Librarians, although Liverpool expect to carry one out in order to identify any skills gaps their Subject Librarians might have, and to develop a plan for bridging them as part of the work on developing a new model for research support. Several libraries mentioned that they use the local appraisal or annual review process to identify the individual training needs of their Subject Librarians. At Liverpool, Subject Librarians and their Line Managers are encouraged to reflect on the skills required to do the job, to identify any gaps and suitable training to address them, during their Professional Development Review (PDR) process. New support requirements are also discussed in this process, and acquiring new skills can be built into an individual's targets for the year. The training related PDR documentation is reviewed to identify themes that emerge and to inform the internal staff development programme and spending priorities for the staff development budget.

3.4.2 Findings from the skills gap survey – assessment by Subject Librarians

Subject Librarians and their managers were asked in the skills gap survey to assess the extent to which Subject Librarians currently possess the skills and knowledge identified. The returns from the survey provide a more refined and systematised picture of the gaps.



“As mature organizations, research libraries recognize the challenge associated with truly transforming their processes and services. Existing workforce may or may not have the skills required in the future.”

(ARL 2010a)



Respondents with Subject Librarian responsibilities were first asked to assess their own level of skills and knowledge. The full results are shown in Table 2 (page 101) which lists the responses in descending order of the percentage of people who identified that they have limited or no skills or knowledge in an area.

Taken together with the results of the relative importance respondents gave to the skills and knowledge, it is possible to make the following categorisations:

High skills gap, relatively high importance

This is the most significant category of findings and. There are nine areas where over 50% of the respondents with Subject Librarian responsibilities indicated that they have limited or no skills or knowledge, and in all cases these were also deemed to be of increasing importance in the future. These are listed below, ranged in order of the importance in 2 – 5 years that respondents placed on them.

The nine areas identified as having potentially the most significant skills gap are

- Ability to advise on **preserving research outputs** (49% essential in 2-5 years; 10% now)
- Knowledge to advise on **data management and curation**, including ingest, discovery, access, dissemination, preservation, and portability (48% essential in 2-5 years; 16% now)
- Knowledge to support researchers in **complying with the various mandates of funders**, including open access requirements (40% essential in 2-5 years; 16% now)
- Knowledge to advise on potential **data manipulation tools** used in the discipline/ subject (34% essential in 2-5 years; 7% now)
- Knowledge to advise on **data mining** (33% essential in 2-5 years; 3% now)
- Knowledge to advocate, and advise on, the use of **metadata** (29% essential in 2-5 years; 10% now)
- Ability to advise on the **preservation of project records** e.g. correspondence (24% essential in 2-5 years; 3% now)
- Knowledge of **sources of research funding** to assist researchers to identify potential funders (21% essential in 2-5 years; 8% now)
- Skills to develop **metadata schema, and advise on discipline/subject standards and practices**, for individual research projects (16% essential in 2-5 years; 2% now)

While initially it may seem surprising to see metadata on a high skills gap list given that this is a traditional preserve of librarians, it is less surprising given that Subject Librarians are moving beyond providing advice and services related to bibliographic metadata into a much richer environment of metadata and tagging for research data, information and outputs in a more diverse range of formats than text and print.

Relatively high skills gap, high importance

Of the nine skills and areas of knowledge identified as currently essential and increasingly important in the next two to five years (see Section 3.3) only one area, '**awareness of current and changing local research interests**', was identified by significant number (17%) of respondents with Subject Librarians responsibilities as an area they feel they have limited skills or knowledge in. The majority of Subject Librarians felt they had considerable skills in the remaining eight areas, although a significant percentage nonetheless felt they would benefit from a refresher.

3.4.3 Findings from the skills gap survey – assessment by Subject Librarians’ Managers

The Subject Librarians’ Managers were asked to assess the extent to which they think Subject Librarians in general currently have the skills and knowledge in the list. The detailed results are shown in Table 3 (page 104).

On the whole Managers were more pessimistic than their Subject Librarians about the level of skills the latter have. Nonetheless there was considerable synergy between the two sets of results. Eight of the nine of the items in the ‘high skills gap, relatively high importance’ group (see Section 3.4.2) fell into the same group when judged by the Managers, although there was some minor variation in the proportion of respondents in each case. The Managers assessments also put the following into the same category (i.e. more than 50% of Managers thought Subject Librarians have limited or no skills and knowledge):

- Knowledge to advise on the **management of researchers' information**, including its portability
- Knowledge to advise on the **manipulation and presentation of researchers' information**
- Understanding of a **typical researcher's experience**, including their workflow, and how researchers access and use information, within a discipline/subject and at different stages of the researcher’s career

Interestingly, a larger proportion of Subject Librarians (53%), than Managers (30%) judge that they have limited or no knowledge to advocate for, and advise on, the use of metadata.

3.5 Commentary

The study identified a set of 32 skills and areas of knowledge that Subject Librarians currently need, or will need in the future, to varying degrees, if they are to perform the tasks discussed earlier that will provide the support researchers require. These are in addition to what might be called ‘core’ skills, such as communication, negotiation and presentation skills, required by this category of staff, which may in many ways, as the Melbourne respondent says “stay relevant...” although “...the professional knowledge will continue to change”. Williams goes further: “As we develop a framework for new roles, we must be aware that even our more traditional roles are undergoing significant changes”¹⁰⁷, and the respondent from Sydney: says, “I see librarians continuing to develop their educational skills, behaviours, and competencies for the foreseeable future”.

¹⁰⁷ Williams (2009)

The issues highlighted around whether or not Subject Librarians need to have a deep knowledge of their subject in the context of rich support for researchers, raises challenging questions for managers, and indeed 'the profession', as to whether or not future recruitment should focus on searching for qualified librarians with some subject knowledge, or graduates in a subject area who could be trained in library-related matters.

Most significantly, the findings of the skills gap survey indicate that there is a high skills gap in nine key areas where future involvement by Subject Librarians is considered to be important now and is also expected to grow sharply. It is in these areas that consideration needs to be given, and decisions made, with respect to training and development, and recruitment.

ARL says, "Leadership plays a critical role in developing and implementing a transformative plan for change within research libraries...Understanding what type of individuals and skills will be needed in the future research enterprise are critical to developing a strong and capable staff to lead the transformation"¹⁰⁸. The Liverpool respondent commented that "The environment is changing rapidly and what we do today may not be useful tomorrow".

Herein lie the caveats in how the findings of the survey might be used. Firstly, they relate to individual responses, and while a majority of respondents may assess that they have a high level of skill or knowledge, the individual need of a single person who feels they have no skills in a key strategic area should still be met by training and/or development opportunities. Secondly, the level of skill and knowledge required in a particular area will vary in each institution depending on what is agreed at the highest level about the Library involvement in a particular area of support. Thirdly, libraries will need to decide whether or not it is desirable or realistic for every Subject Librarian to attain the necessary level of skills and knowledge to satisfactorily support all areas of their remit. For example, one library is taking a team approach in which individuals have a mixture of skills; rather than expecting each to have the same set of skills. Some librarians will have traditional and highly developed library skills; others will have new skills. The managers' main role will be to build a complementary team and get it to work.

In Chapter 4 the various models and posts for supporting researchers are explored.

¹⁰⁸ ARL (2010)

4 Models of ‘library’ support for researchers, Subject Librarians’ job descriptions, other research support posts and staffing structures

In Chapter 2, the current and emerging roles of the Subject Librarian in supporting the information and related needs of researchers was discussed, but little was said about how this support is delivered and how Subject Librarians are organised. One objective of the study was to conduct an environmental scan of ‘Subject Librarian’ job descriptions, staffing structures and models of researcher support. In this chapter some of the ‘traditional’ and new models being employed to engage with researchers are considered, based primarily on the information provided by participating libraries. Other related relevant Library posts supporting researchers, Subject Librarians’ job descriptions, and staffing structures are also discussed.


4.1 Models of ‘library’ support for researchers

The participating libraries gave many examples of how their Subject Librarians currently engage with researchers, many of which could be considered to represent the ‘traditional’ liaison model. Maryland believes that the liaison system, with good institutional and departmental support is the best model to support researchers. One pervasive element of the ‘traditional’ portfolio of the methods is the design and delivery of information literacy training. Numerous and detailed examples were provided by the participating libraries, for example Cardiff, Edinburgh, Manchester John Rylands, Melbourne and Newcastle. Many organise programmes of events or workshops aimed at researchers, covering, to varying extents, such topics as: information management, including bibliographic software management, referencing and citations; plagiarism; copyright; bibliometrics; archival research; getting more from Google; information discovery; RSS and publication alerts; research data management planning; research data curation; and dissemination strategies, including open access publishing. In some cases this training is targeted, e.g. one library provides a six week course in information skills aimed at PhD students and focused on their research areas, while in others it is cross-university and more general. In using information literacy training as a major method of support for researchers, librarians should bear in mind the point made by Bent *et al*¹⁰⁹ when they explore the “polarisation that exists between what researchers think research is about and what they believe the library can offer them”, and suggest that “information literacy needs to be seen as involving a change in understanding of, and attitude to, the world of information, as well as the nature of those information needs”.

¹⁰⁹ Bent *et al* (2007)

Another ubiquitous mechanism Subject Librarians use is the provision of information on the library's web pages. Leeds, for example, has an excellent gateway to information and resources for researchers called *Researcher@Library*¹¹⁰ with information about the research process, research ethics, managing information, and dissemination etc. At Melbourne, some library support material, including a suite of online tutorials¹¹¹ is embedded in the School of Graduate Research's *Developing Effective Researchers* pages¹¹², and other material, such as guides to bibliometrics are available on the Library's web pages¹¹³ as well as in print.

Several places, for example, Leeds and Manchester John Rylands, report helping researchers on a one-to-one basis, ranging from a pre-arranged consultation to an informal encounter, to discuss and respond to their needs. At Liverpool, Subject Librarians will go out to visit researchers if they have a specific problem or information need they would like to discuss and, at Hong Kong formal one-to-one research consultations are offered to postgraduates. Subject Librarians at Warwick are expected to build relationships. They work with newly appointed academics and researchers to show them what the Library can offer, thus providing the foundation for a longer relationship of support for their research, most of which is at a one-to-one level and is driven by the demands of the researcher (so engagement varies). Libraries continue to offer face-to-face desk-based enquiry services, and phone or online support. For example, Canterbury NZ has an instant messaging system (AskLive¹¹⁴) where library users can interact with library staff during service hours, and at Maryland they use internet 'chat'.



“In order to become more visible as academic faculty, academic librarians have to not only think outside of their box-shaped building, but must actively venture physically outside of the protective but restrictive enclosure which librarianship itself has become. In doing so, we remind other faculty that we are both professional and productive, that we offer more than simply “service with a smile” when they need it.”

Sheila Corral (2009)



Others methods are used for engaging with researchers more formally and at a strategic level. These usually revolve around meetings and committees, such as faculty or school research committees, and other support structures, e.g. those at Liverpool for postgraduate research students and early career researchers. None of the participating libraries provided details about contributions Subject Librarians

¹¹⁰ <http://library.leeds.ac.uk/researcher>

¹¹¹ www.gradresearch.unimelb.edu.au/programs/pge/pge1.html

¹¹² www.library.unimelb.edu.au/

¹¹³ www.gradresearch.unimelb.edu.au/programs/

¹¹⁴ http://library.canterbury.ac.nz/services/infoserv/virt_help/welcome.php

make in committees and meetings, which in practice can account for large amounts of their time, or what mechanisms are employed to ensure their attendance gives best value for money. These formal mechanisms are supplemented by other informal communication, such as personal contacts, and participation in departmental events (e.g. research seminars). The respondent for Tilburg expressed concerns for what he calls this 'classical' way of communicating with researchers which may, he says, be more or less selective. A recent internal report at Trinity College Dublin echoes this and found that "current support is very uneven and the role of a Subject Librarian was not well understood by academics".

Some of the participating libraries report that they are developing and extending their traditional method of support, or that they plan to. At Trinity College Dublin, academic colleagues have made it clear that they wish to have a named Library contact, and it is planned to assign resources to a focused Teaching and Research Service that will address imbalances across the full range of Schools and provide consistent support. The main focus for a restructured Readers' Services division will be on the delivery of personal help, either face-to-face or via web-based services. On the other hand Warwick, in planning to develop the services and skills sets of the Library to meet wider researcher needs has established a new research support team within the Library, which is reviewing support mechanisms and user needs throughout the researcher journey. The team will then develop research support offerings (e.g. on how to improve impact) which will be rolled out in conjunction with Academic Support Librarians, who can tailor packages to meet local subject needs.

Several libraries report an evolution or possibly a transformation from this traditional liaison model to a new way of working with researchers. Purdue describe it as including "deeper interactions with researchers 'further upstream' in their research" and, like Sydney, their Subject Librarians are increasingly becoming involved in conducting research and collaborating with researchers on projects. At Purdue they are applying library science to problems related to the organisation and dissemination of research data, often as co-Principal Investigators. In such cases, Subject Librarians become embedded in laboratories and project teams, and gain a much deeper understanding of constituent research, and so assess needs from a different perspective. This presents opportunities to build new services for clients, as well as develop skills and knowledge for themselves.

Rice University anticipates that Subject Librarians will spend more time "out of the library, in the academic departments or other university spaces" and have experimented with a version of the 'embedded' model in which a Subject Librarian schedules regular hours in academic departments. Toronto envisage more "out of the library" collaborative working at place of need (either online or in the faculty location) and

have some 'embedded' librarians working directly with science faculty at non-library sites. At Cardiff, Subject Librarians' time has been freed up for direct liaison with researchers and academic staff, and they are moving to a position where they are acting increasingly as proactive research partners in addition to their traditional role as service providers. They are increasingly working within research teams when the project involves a large information component or includes a systematic review. One UK respondent speculates on whether Subject Librarians should be 'taken out of the Library' and embedded into departments, in order to provide the support that researchers need and which fits in with the way they work. They think that as Departmental support staff they may be more highly valued than support staff from a central university service because they fit into researcher workflows. The British Library has been developing the concept of the Research Information (RI) Manager in consultation with a number of research organisations, and an ongoing JISC-funded project¹¹⁵ is exploring the benefits and risks of establishing and embedding such a dedicated information specialist post within a multidisciplinary research environment (initially the Accessibility Research Group, at University College London). The project will also develop a methodology for defining and embedding the role.



"Re-establishing a lively and sustained dialogue with their research communities is a key challenge for the library and information services in many universities...Better engagement between information professionals and researchers could add to the efficiency and effectiveness of research, with specialist support facilitating the use of new tools, and providing individualised professional advice, training and documentation on a subject or discipline basis. Such a strategy would have to be proactive...And it would have to meet the challenge of delivering results that correspond to researchers' patterns and timetables of work."

Research Information Network and the British Library (2009)



This new model requires Subject Librarians to be more assertive and proactive, seeking out researchers to discuss their activities, assess needs, identify strategic opportunities to act on, and help describe and propose solutions to a problem. These solutions may be 'traditional' or may involve "exploring new territory or developing new skills", to quote the Purdue respondent. Many institutions identify a similar trend. Developments are taking place at Leeds where Subject Librarians occasionally join a research team, and may do any or all of the following: co-author funding bids, advise on information sources and search methods, conduct literature searches, manage research data, write up search methodology in a final report, co-author publications, and advise on dissemination, IP, and copyright. Restructuring at Durham will allow Subject Librarians to develop closer relations with departments for which they are responsible, and to spend more time getting to know

¹¹⁵ www.jisc.ac.uk/whatwedo/projects/rimroles.aspx

researchers and their research interests. The respondent from Northumbria said, “I think services for researchers will broaden and deepen as the University enhances its research profile...we will need to be innovative in our thinking about services, looking at how we can take our present services out to researchers through our existing channels as well as developing new services which we deliver to them at their desktop”. The Melbourne respondent observes that the great majority of researchers do not come to the Library frequently, and while in the past there was a great reliance on academic ‘champions’, librarians now have an obligation to meet the broad needs of the research community and require strategies for approaching researchers in their own domains.

Tilburg would like to see the Subject Librarian become more of an ‘account manager’ and less of a collection specialist, and to actively go out into faculties looking for ways the Library and IT Services can better support research and overcome existing bottlenecks. They would offer a much broader palette of services. At Hertfordshire they have gone a little further. They decided that they had outgrown their model of an information professional role as the key named liaison person with a specific faculty or constituency and needed a broader role as the ‘partnership conduit’ working with Schools and Strategic Business Units that is capable of operating at a more strategic level. They implemented a new structure in which Knowledge and Business Intelligence Consultants are involved in activities that Schools would not previously have thought to ask an information professional about e.g. secure document management, research data management and recording of incidents, information research to support research funding bids, etc. Newcastle foresee a similar change in role to one of client manager brokering services, rather than a Subject Librarian supporting researchers as one of their (many) communities.

The need for this more thoroughgoing model of engagement and embedding is highlighted in the RIN/BL Report which says, “Re-establishing a lively and sustained dialogue with their research communities is a key challenge for the library and information services in many universities...Better engagement between information professionals and researchers could add to the efficiency and effectiveness of research, with specialist support facilitating the use of new tools, and providing individuated professional advice, training and documentation on a subject or discipline basis. Such a strategy would have to be proactive...And it would have to meet the challenge of delivering results that correspond to researchers’ patterns and timetables of work”¹¹⁶.

ARL argues that the paradigm shift taking place in higher education has “led to a broadening of liaison librarian roles at research libraries” and that the liaison model must evolve into this

¹¹⁶ Research Information Network and the British Library (2009)

engagement model which includes an understanding of, and support for, all processes of scholarship. Subject Librarians will be “challenged to become more outwardly focused, striving to understand the needs and changing practices of scholars and students in order to shape future directions. Building strong relationships ... and establishing collaborative partnerships ... will be necessary building blocks to our success”¹¹⁷. As Bent *et al* say “Librarians may need to raise their profile, become ‘researchers’ themselves; getting embedded in the research community; gaining credibility; and collaborating as equals”¹¹⁸.

When and how Subject Librarians engage with researchers will be critical to the effectiveness of their partnership. The RIN/CURL report identified a number of challenges and concluded that “There are significant differences between researchers and librarians in attitudes, perceptions and awareness of key issues. Many believe that communication channels need to be improved but achieving this is not easy. There is a danger that the role of libraries may be diluted...This potential divergence of paths is not inevitable; but libraries need to proclaim their value so that researchers properly understand and acknowledge what the library is bringing to their working lives, and most particularly to their desktops”¹¹⁹.

4.2 Subject Librarians - job descriptions

Throughout the Report, the term Subject Librarian has been used to signify a category of library staff that encompasses a large assortment of similar posts with differing job titles, including Academic Liaison Librarian, Faculty Support Librarian, Faculty Team Librarian, Information Specialist, Liaison Librarian, Library Liaison Adviser, and Support Librarian. Commonly, their positions are aligned to specific faculties or departments and/or disciplines, and so research support is similarly targeted. At Southampton the question is being posed, in terms of the restructuring of the University, as to whether to build teams around subjects/faculties or whether to build them around activities/strategies e.g. research support. Most, if not all, Subject Librarians also support teaching and learning activities, and indeed until recently it could be argued that this has been their predominant focus.

The respondent at Durham made the point that developments in the role of the Subject Librarian of the kind discussed above, and in Chapter 2, must be set within the context of the need to provide services for everyone. Subject Librarians largely deal with the whole range of students, from undergraduate to

¹¹⁷ www.arl.org/rtl/plan/nrnt/nrntliaison.shtml

¹¹⁸ Bent *et al* (2007)

¹¹⁹ Research Information Network and the Consortium of University Research Libraries [now RLUK] (2007)

research student, and support the teaching needs of academic colleagues as well as their research needs. They help people ranging in age from 18-80 and with vastly different experience levels. It will be important to ensure that providing support for one target group is not done at the expense of another unless a strategic decision to do so has been taken, and the need to develop both generic and targeted training and support is a constant tension. In many cases, Subject Librarians, in the way the term has been used in this study, may be responsible for more than a single subject and even possibly for more than one discipline.

In this complex, evolving and fast moving context of supporting researchers in new areas and in new ways it is essential that staff have a clear understanding of what is expected of them, both in terms of tasks and level of skill and knowledge, and in terms of standards of delivery. The job description and person specification for a post continue to be the baseline for providing this clarity. The University of Minnesota have invested heavily in reinventing the traditional liaison model, and a key tool in this process is the 'Position Description Framework' which is the foundation for all their job descriptions. It is a "living document that needs regular review for alignment with a constantly evolving environment..."¹²⁰. The framework "redefines traditional roles (the 'holy trinity' of reference, instruction, and collection development ...) and integrates the new roles that librarians increasingly find themselves occupying". The Framework encompasses ten elements with explications and examples of activities that would be included in them. Scholarly Communication, for example, contains the following activities:

- Educate and inform faculty, graduate students, and campus administrators about scholarly communication issues. Examples include:
 - Helping faculty and graduate students to understand their rights as authors.
 - Contributing content to Libraries' copyright and/or scholarly communication Web sites.
- Advocate for sustainable models of scholarly communication.
- Work closely with faculty and students to understand their changing workflows and patterns of scholarly communication; assist in the development and creation of tools and services to facilitate scholarly communication.
- Recruit content for the University Digital Conservancy (Minnesota's institutional repository).

Most participating libraries provided copies of the job descriptions and person specifications for their Subject Librarian posts. On the whole these documents make little mention of support for research, and even when they do the tasks and responsibilities included, and the skills and knowledge mentioned, are

¹²⁰ Williams (2009)

couched in very general, rather than specific, terms. By and large they do not reflect the richness of the role identified in Chapter 2. Examples of Subject Librarians' job descriptions that mentioned, for example, information management, research data management, support for research quality assessment exercises, and advice on publishing and scholarly communication were few and far between. To some extent the reasons for this are understandable, for example a desire to ensure flexibility in deployment, to reduce the need to constantly amend documentation, and the constraints imposed by institutional human resource regulations. But as documents to provide post holders with the clarity about the tasks that are required to perform their duties in the way that is wanted, and to the standards required, they are limited; as is their usefulness in ensuring that new recruits are appointed with the full skills set and/or the level of skills required. Of course, managers can use the annual review and appraisal processes to address these, and to set targets and monitor performance.

That said, a few of the job descriptions submitted do provide some good examples that highlight new responsibilities, for example:

- Keep up-to-date with developments and trends in specialist subject areas, as well as teaching and research activities on these disciplines
- Proactively identify the needs, working methods and expectations of the [University] research community, ensuring a thorough understanding of the research process and the range of research activities undertaken
- Proactively understand the needs of researchers and interpret and develop these into library services
- Maintain a detailed knowledge of...research undertaken by the school or discipline area and the associated information resource and service requirements
- Develop and maintain knowledge of current collections in assigned subject areas and be aware of new developments
- Assist (in person and virtually) colleagues with effective resource discovery together with support for processes around communicating research outputs such as raising awareness of copyright issues, bibliometrics, publication impact issues and submitting papers for Open Access publication, as well as management of research assets, in line with institutional requirements
- Actively support the [national research assessment exercise e.g. RAE] by contributing to the verification process and soliciting contributions to the Institutional Repository, and promoting open access publishing
- Contribute significant expertise and advice for the development and management of current and emerging services...including information and lending services, information literacy, bibliometrics, research training and research data management
- Collaborate with researchers to help manage, make accessible and preserve primary data sources
- Liaise with academic researchers regarding locations, descriptions and access to primary research data sets

- Regular liaison as required in relation to research grants, institutional repository, profiler, e-theses and research liaison
- Review, support and train Liaison Librarians and academic staff in systems that will support research activities e.g. bibliographic management tools, plagiarism detection services etc.

Similarly some interesting examples of requirements in person specifications designed to ensure the post holder can deliver the new responsibilities were identified, for example:

- Subject background in [the subject or discipline or related discipline] demonstrated through academic degrees, course work, publications or substantive experience
- Knowledge of the information resources, research needs and scholarly communication methods of the biomedical disciplines
- An understanding of the research process and an ability to empathise with those engaged in research
- An understanding of issues in the research environment and research agenda
- An understanding of the issues in research communications and bibliometrics or a willingness to learn
- Awareness of current developments in e-Research ...
- Demonstrated knowledge of current and emerging technologies
- ... a background in the support of research and research training issues in the higher education sector and a broad general knowledge of current issues and developments in research globally

By and large, however, person specifications do not include detailed requirements for skills and knowledge required to support many aspects of the emerging role for Subject Librarians, for example information management, research data curation, and support for quality assurance processes. Nor in general do they clearly specify the level of skills or knowledge that post holders need to have, for example considerable, practical, or sufficient to give advice.

The findings of a recent survey by Brewerton¹²¹ of Subject Librarian's job descriptions and person specifications in 33 UK universities which provides a broad overview and analysis of the job titles, traditional 'core' duties and responsibilities, and new roles being included in this documentation, echoes many of the points made above. Research support appeared in the job purpose and/or key activities in almost 50% of the sample, although he is forced to conclude that, "The specific points of specialist research support the I would expect to see are more thinly represented than I would have hoped".

A checklist of items related to the support of researchers that might be included in job descriptions and person specifications can be found in Appendix D.

4.3 Other posts supporting researchers

There are, of course, other posts that support researchers more or less directly, for example Library Assistants providing operational support, Senior Managers with strategic responsibilities for research support, and middle managers responsible for coordinating the work of Subject Librarians. Other Library posts, for example those in systems, circulation, collection management and inter-library loan, were also identified as contributing to researcher support, as were a number of specialist posts.

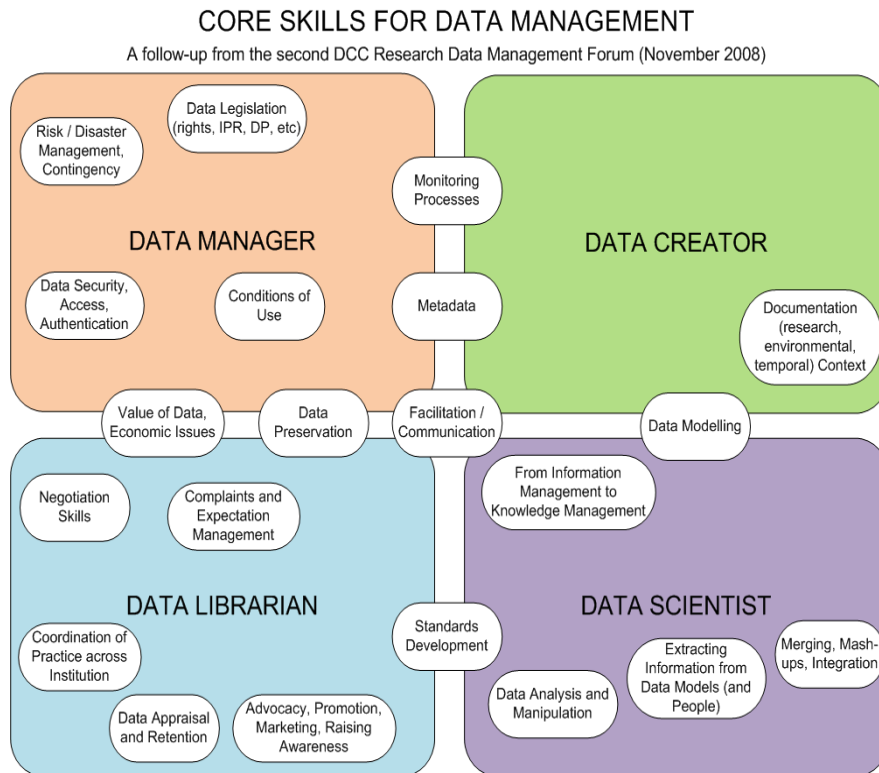
One role regularly mentioned by participating libraries is that related to the management and operation of the Institutional Repository. In some cases, for example Canterbury NZ, Melbourne and Warwick, this is a dedicated post or posts; in others, the responsibility has been assigned to an existing post, e.g. at Hong Kong. At Liverpool, the Research Archive Librarian manages the University institutional repository and provides support not only for researchers supplying metadata and full text of publications to meet internal and external requirements (e.g. REF preparation) but also for research managers using this data in decision-making through the integration with other systems and the data they hold. At Newcastle, the Repository Officer also provides direct support in managing IP and copyright issues relating to publication, and at Northumbria, staff supporting the institutional repository work with Schools to streamline processes for capturing outputs and work with a wider University team to support the REF. This involves staff from the Digital Library team working to obtain research outputs and copyright clearance for them as appropriate.

Those working in archives, and special and cultural collections were also highlighted as working closely with, and supporting researchers, for example at Liverpool, Maryland and Southampton. Their activities include building research collections, assisting researchers, and providing advice on research strategies. Some universities have staff that focus on providing researchers with training in information literacy and related skills and activities. For example, the Researcher Training Librarian at Leeds, and the Researcher Training Librarian at Durham who will take the lead in the development and delivery of training sessions, with Subject Librarians delivering increased researcher training for their departments. Purdue has a Data Research Scientist (whose salary is partially funded by grants) who identifies, analyses and interprets research data needs and works closely with Subject Librarians. Toronto and Tilburg have Data Librarians, and at Tilburg the post actively supports and assists researchers with all matters concerning research data, from creation to archiving and re-use. This is a well appreciated service in high demand that they would like to expand. Melbourne is currently building capability for research data support librarians.

¹²¹ Brewerton (2011)

The Digital Curation Centre argues that digital curation cannot be the responsibility of one individual, no matter how skilled they are¹²². They have developed an overview of the roles and responsibilities involved in digital curation and identify the four roles of Data Creator, Data Manager, Data Librarian and Data Scientist as shown in the diagram produced by them¹²³ (see Diagram 2)

Diagram 2



There is a relatively ‘long tail’ of other posts that support research, for example:

- An Interdisciplinary Research Librarian at Purdue providing support for researchers collaborating in large-scale cross-, multi-, or inter-disciplinary projects, coordinating with librarians associated with researchers’ departments.
- Information Specialists in the Support Unit for Research Excellence (SURE)¹²⁴ at Cardiff that partner with researchers to provide support for grant applications; identify, evaluate and summarise current, reliable evidence; and teach systematic review methods.
- Information Management professionals at Melbourne responsible for the development of policy, procedures and frameworks on, for example, research data management and copyright; and for supporting researchers writing grants to understand the information

¹²² www.dcc.ac.uk/resources/roles

¹²³ www.dcc.ac.uk/sites/default/files/documents/RDMF/RDMF2/coreSkillsDiagram.gif

¹²⁴ www.cardiff.ac.uk/insrv/libraries/sure/index.html

management, long-term preservation, and management of data implications of research, including cost.

- A University Digitisation Service at Melbourne providing consultancy and advice on, for example, costing the digitisation components of a research project; standards, metadata and best practice workflows for digital capture; and digitisation training.
- A Digital Collections Librarian at Purdue promoting library services related to digital publishing and scholarly communication through the development of digital collections, specifically by establishing and populating collections of Purdue-associated scholarship in the institutional repository.

Liverpool believes that the model of research support will need to change because the way researchers are working, and research is being carried out, are changing. Developing research support is a focus of their academic liaison team and over the next twelve months they intend to build on the work done by the RIN and others and carry out some research locally on the support requirements of researchers at Liverpool. Once they have analysed the results of this research they hope to have a clearer idea of how the model will need to change. Without wanting to prejudge the outcomes of their research, they can foresee the possibility of needing to recruit to new roles such as Research Information Specialist or Data Librarians and to integrate them into the subject teams to provide specialist support researchers on issues like data management and manipulation.

4.4 Staffing structures

The participating libraries provided copies of their organisational charts and commentaries on these. Quite a few have recently undergone, or are planning, reorganisations that include their Subject Librarians, for example at Canterbury NZ, Durham, Northumbria, and Southampton. Trinity College Dublin anticipates aligning the Library structure and resources with the University's teaching, learning and research environment, to enable better support to meet both teaching and research needs.

Structures continue to be hierarchical, albeit 'flatter', than in the past. Subject Librarians tend to be located in a 'division' which includes other functional responsibilities, and are often grouped in teams. There is very little commonality in the names of divisions; examples include Research and Academic Engagement, User Services, Research and Learning Support, Academic Liaison, and Public Services.

Currently most Subject Librarians have Teaching and Learning support responsibilities as well as responsibilities for supporting researchers and occasionally also for other functions. Northumbria has recently introduced a matrix structure, and Subject Librarians are located in three functional teams, one of which, the Research Support and Collection Development team, works with the Graduate School to deliver cross-university generic research and information literacy skills and develops training materials

which can then be delivered by all Subject Librarians. Subject Librarians at Southampton also have matrix relationships, and are 'organised' at three levels: site; faculty group; and activity/strategic groupings which are horizontal/thematic. Dedicated research support teams, for example the one being introduced at Cardiff, appear to be a rarity. Trinity College Dublin, where they are losing staff under a public service recruitment moratorium, expect to take a team approach to support; every School will have a primary Liaison Librarian and a Research Support Librarian responsible for responding to its needs which may be met by a team member, or by a colleague from another Library section. Is the hybrid role appropriate in research-intensive libraries, or will Subject Librarians need to be assigned to either research support or teaching and learning in order to provide the necessary level of expertise and support?

The organisational charts did not have sufficient granularity to compare numbers. It would however be interesting to explore the range of staffing effort dedicated to Subject Librarian work and the relative workloads (expressed for example in numbers of researchers in the University). Durham's recent reorganisation will increase the number of their Subject Librarians from 3.5 to 6.5 (although they emphasise they will still not be Subject Librarians in the traditional sense) so they will have fewer departments with which to liaise, allowing them to concentrate more on developing library services which match departmental needs.

4.5 Commentary

There is a clear trend towards providing support for research that is driven more by the requirements of researchers than it has been in the recent past, and a movement in some institutions towards a more proactive model of engagement with researchers. The Tilburg respondent, for example, says that the focus needs to change from collections, to the process of doing research and mainly supporting the latter, "from collections to connections". Williams makes the point however that "Moving from a collection-centred model to an engagement-centred one does not happen overnight"¹²⁵. Part of that movement will have to be a discussion and decisions within institutions about the degree of support to be provided to researchers and where this support will come from, for example from the Library, Research Office or its equivalent, or other University departments.

Within libraries, decisions will have to be taken about how best to deliver the support researchers need. For example, will the role of the Subject Librarian be transformed to become a more multi-faceted role embedded into the research work of the institution; or will Subject Librarian posts be realigned to functions, with some dedicated to supporting researchers; or will a different hybrid model of a mix of

posts including Subject Librarians, Data Librarians etc., be used? Will the primary role of Subject Librarians focus around content and collections, or around delivering expert supporting services and guidance, or will they focus on acting in a brokering role between different agencies? These models may themselves be stages on a path to a new model not yet envisaged. Decisions will inevitably be based on local factors including the place of research in the strategic objectives of the institution, resources, and existing posts elsewhere in the university. They will also be based on a judgment of how well new posts and models are working in libraries in the vanguard of the 'new way of doing things', an assessment of their sustainability, and judgements about what services and support currently provided in other areas can be reduced or stopped. As the respondent from Purdue observes, "Because these areas are fairly new and not yet mature, service models for dealing with them don't exist to match our environment, but we are prototyping systems and services to address them".

The Newcastle respondent, for example, says that the main elements of research support "may be differentiated into different roles at different levels, rather than attempting to pack more in Subject Librarians' portfolios". Hahn argues that as a consequence of the growing range of activities involved in liaison work, Subject Librarians in the broad sense used in this study, "cannot be expert themselves in each new capability, but knowing when to call in a colleague, or how to describe appropriate expert capabilities to faculty, will be key to the new liaison role. Just as researchers are often working in teams to leverage compatible expertise, liaison librarians will need to be team builders among library experts where this advances client research. New liaison roles are not emerging *de novo*, but rather in continuity with established roles"¹²⁶. Melbourne anticipates that "the Library will continue to provide traditional support to researchers but Subject Librarians will also expand their roles to incorporate new developments in scholarly information. Their work will increasingly be supplemented by specialists operating in the areas of digitisation, research data management, scholarly publishing".

Whatever model of support is used, a critical issue for Library Managers and the Librarians responsible for supporting researchers, is to ensure that when delivering their services and support that they are relevant to the researchers' disciplinary approach and the stages of their career, are timely, fit in to their work flow, and are of high quality.

¹²⁵ Williams (2009)

¹²⁶ Hahn (2009)

5 Training opportunities

This chapter explores the opportunities for Subject Librarians to acquire any additional skills and knowledge they need to perform their role in support of researchers. As set out in Section 1.3, it draws on information gathered from the participating libraries about the methods they currently utilise to provide training and development opportunities, and from a selection of UK training providers, and a group of Library and Information Schools located in the UK and internationally.

5.1 Methods used to meet training and development needs

All of the participating libraries reported providing their Subject Librarians with training and development opportunities. Little was said about the identification at a strategic level of training needs for the whole cohort of Subject Librarians locally, although they frequently noted that individual training needs are in large part derived from some form of annual personal and professional development. At Minnesota, they used an inventory of knowledge, skills, and abilities that “allowed individuals to identify areas where they felt they had expertise and areas where they needed to learn more. Results of the inventory were returned by department, not individual, so that liaison librarians would not feel constrained in their self-reporting. The results of the inventory are being used to guide staff education efforts”¹²⁷. Also, their performance evaluation process was revised some years ago to more accurately reflect expectations and the roles of librarians.

The overall impression is, however, that opportunities tend to be responsive and opportunistic, rather than structured and carefully planned; one library admitted that they lack a good training programme for new Subject Librarians. Sometimes libraries have a group responsible for coordinating training and development events, for example the Staff Education Coordinating Team at Maryland, where a regularly updated blog¹²⁸ is used to alert staff to items of news such as upcoming conferences and interesting reports.

One exception to the relatively *ad hoc* provision of training and development is found at Melbourne where their ambition is to develop a training programme for librarians, and potentially other research support personnel, to build knowledge and understanding of the needs of researchers in the management of their research data. The proposed programme of training will be tailored to the current workload and range of support currently provided to the research community. Some progress has been made in

¹²⁷ Williams (2009)

¹²⁸ <http://blogs.unimelb.edu.au/libraryintelligencer/>

targeted areas, i.e. digital curation and providing the opportunity for staff to work on research projects concentrated on data capture and discovery.

The majority of the libraries participating in the survey report that Subject Librarians attend in-house events provided at both Library and University level. The topics covered a wide range of 'core' skills as well as those related more specifically to research support, although these were reported less frequently. Topics covered in events held include: financial, statistical, web design, communications, presentation, and teaching skills; evolving scholarly communication; institutional repository development; open access issues; information literacy; citations and getting research known; academic liaison techniques; Web 2.0 technologies; and new collection models. These in-house sessions take a number of forms. In some circumstances courses are provided by external training organisations, including professional bodies such as, CILIP (Chartered Institute of Library and Information Professionals), NOWAL (The North West Academic Libraries consortium), ARL, and LIANZA (The New Zealand Library Association), and private companies or individuals. Libraries also report using suppliers and vendors such as Bloomberg, Scopus and Thomson Gale. Peer-training, or sharing in-house expertise, is also common. Melbourne have held quarterly liaison forums on topics such as bibliometrics and e-Research, and Maryland have used library employees to deliver sessions on Facebook, EndNote, etc. Toronto has introduced "FLISA" (Faculty Liaison: Inspire, Support, Activate) groups – a form of peer mentorship to support subject-based faculty liaison. At Liverpool, a number of events have been held aimed at sharing best practice in research support, drawing on the knowledge of a 'community of practice' of Subject Librarians in all the local universities.

Several libraries report that learning takes place 'on the job'. At Southampton, staff are encouraged to engage externally, provided that skill development is relevant and employed 'on the job' and they 'build capacity around activity', for example a data management project or migration to e-theses, rather than programmes of training. Purdue reports working in the area of research data curation, learning-by-doing on a project-to-project basis. Corral echoes this: "Learning through work-based activities can be highly effective in many cases". She goes on to add, "... giving staff time out for reflection enhances their learning. LIS practitioners are increasingly recognising that more formal approaches to reflection can contribute significantly to both individual and organisational development"¹²⁹.

In-house programmes are regularly supplemented by attendance at external meetings, seminars conferences etc. Examples include subject-focused events, for example run by BIALL¹³⁰ and those focused

¹²⁹ Corral (2009)

¹³⁰ www.biall.org.uk/events.php

on information skills, for example LILAC¹³¹. Others are oriented towards technology e.g. EDUCAUSE¹³² and the Ticer Summer Course 'Digital Libraries a la Carte'¹³³. Both Rice and Toronto have made a number of webinars available and encourage librarians to attend. The respondent from Rice thinks that there may be more reliance on the online programmes as travel budgets are reduced. As one respondent notes all these events are frequently more about knowledge and awareness than acquiring practical skills.

There are fewer examples of events focused on research support, but respondents did mention those organised by RLUK, RIN, and the White Rose Research Information Forum (e.g. 'the Research Life Cycle', and 'Librarians and Research Support: what do we need to know'). RLUK and DCC are currently (January 2011) in discussion about training interventions for librarians in relation to research data management and curation. LSE, Oxford and the British Library organised an event to share what they are doing in supporting researchers, and a respondent suggested that it might be good to open it out to a wider audience. Another example of a collaborative training initiative is between University College Dublin, Dublin City University, National University of Ireland Maynooth and Dublin Institute of Technology who have successfully bid for funding for a project¹³⁴ to produce bibliometrics awareness and training materials. The deliverables will include an online tutorial, worksheets, posters, booklets, and multimedia elements.

5.2 Training providers

The aim of this part of the study was to identify training opportunities and gaps, by asking a number of organisations known to provide training for librarians or who might have an interest in doing so about the extent to which they are providing courses in a number of areas identified in Chapter 3, and by exploring with them any opportunities for collaboration with RLUK. The providers who contributed to the study are listed in Section 1.3. All of the Research Councils were invited to participate. With hindsight this was probably inappropriate. As a representative from AHRC explained, they are a funding body and do not provide training for researchers. Similarly the ESRC, while completing the survey, also noted that they are not a training provider but rather act as a catalyst to stimulate good practice for training and development. Some of their investments, including the Researcher Development Initiative and the National Centre for Research Methods, do include training for social science researchers (but not for librarians), but these are all short-term projects. The returns to the survey then are small, and should be seen as probably indicative of trends rather than providing an absolute picture of training provision.

¹³¹ <http://lilacconference.com/WP/>

¹³² www.educause.edu/E2010

¹³³ www.tilburguniversity.nl/services/lis/ticer/2010/index.html

¹³⁴ www.ucd.ie/library/guides/pdf/introducing_myri_project.pdf

The survey suggests that most of the skills and knowledge identified in Chapter 3 as potentially needed by Subject Librarians to support researchers are not being made available as part of the normal offering of the more generalist training and development providers. Some will provide training 'on request' but in nearly all areas the providers report that this skills and knowledge set is not part of their normal offering. See Table 4 (page 107). The training most easily available from the responding providers is in:

- Current trends, best practice and available options in research publication and dissemination methods, including scholarly communication and open-access publishing
- Skills to participate effectively in research projects
- Project bid and report writing
- Author rights, copyright legislation and IP issues, and plagiarism
- Evaluation skills, e.g. of information and data sources, collaborative opportunities etc
- How researchers access and use information, within a discipline/subject and at different stages of the researcher's career
- Mobile technologies, Web 2.0 and other researcher communication tools
- Sources of research funding
- Marketing library services to researchers
- Research impact factors and performance indicators, citation analysis, bibliometrics, etc.

Only one of these, 'sources of research funding' is on the list of 'high skills gap, relatively high importance' (see Section 3.4.2). Of the other items on that list, training in 'sources of research funding' could be provided currently by 44% of the providers, and in the 'ability to advise on preserving research outputs' by 33%. But of the remaining seven areas on that list only 27% or fewer providers could provide training now, or expect to be able to in the future.

The areas where the provision is very limited (less than 20%) from the responding providers are:

- Content (in various media) available to different disciplines/subjects
- Data management and curation, including ingest, discovery, access, dissemination, preservation, and portability
- Information discovery and literature searching
- Synthesis and analysis skills to provide digests of 'discovered' information
- Citation and referencing, and the use of bibliographic management software
- Compliance with the various mandates of funders, including open access requirements

The survey asked the training providers whether they could envisage any opportunities for collaborating with RLUK to help to equip librarians with the skills and knowledge to support the current and emerging research environment. The Vitae respondent indicated that they would be interested in working with library services. Vitae is a national organisation, with eight regional hubs, that aims to be world-class in supporting the professional development of researchers and researcher careers in the UK. Vitae is supported by Research Councils UK (RCUK) and managed by CRAC: The Career Development Organisation, and builds on the work of the UK GRAD Programme that ended in 2007, and the UK Higher Education Researcher Development Group (UKHERD). Vitae champions "the personal, professional and career

development of doctoral researchers and research staff”, and works “with higher education institutions and research institutes to provide specific support for doctoral researchers and research staff”¹³⁵.

Vitae has recently issued a Researcher Development Framework (RDF) and Researcher Development Statement (RDS) which builds on the Joint Skills Statement of Skills Training Requirements (JSS)¹³⁶ issued by the UK Research Councils in 2001. The Framework supports the Roberts’ agenda¹³⁷, and is endorsed by several organisations, including the Quality Assurance Agency for Higher Education, Research Councils UK, the Russell Group, and the Research Information Network. It “describes the knowledge, behaviours and attitudes of researchers and encourages them to aspire to excellence through achieving higher levels of development”. It will be invaluable for planning, promoting and supporting the personal, professional and career development of researchers in higher education”¹³⁸. Many of the areas covered in the Framework parallel the areas identified in Chapter 2 and for which Subject Librarians can provide support, and in which they have identified training and development needs. Examples of some of these areas in the Framework are: information seeking, information literacy and management, evaluating, networking, legal requirements, IPR and copyright, attribution and co-authorship, and publication.

ESRC suggested that RLUK might like to co-fund an initiative to support the development of both librarians and researchers (so the latter know how to make most effective use of the former). UKSG would also be pleased to collaborate with RLUK, and would welcome the opportunity to have a conversation regarding the ways in which their expertise in the area of scholarly communication, electronic information management, and journals publishing could be used to best advantage in helping librarians to support research. RIN, hopes be able to continue to undertake research and provide reports and guidance on a range of issues relating to changes in the activities, roles and responsibilities of the key groups of players in the scholarly communications landscape; and to researcher’s attitudes and behaviours both as producers and consumers of research outputs. RIN is a “policy unit funded by the UK higher education funding councils, the seven research councils and the three national libraries”¹³⁹. RIN’s aims are to

- enhance and broaden understanding of how researchers in the UK create and use information resources and services of all kinds

¹³⁵ Vitae (2008)

¹³⁶ www.vitae.ac.uk/policy-practice/1690/Joint-Skills-Statement.html

¹³⁷ SET for success (2002)

¹³⁸ Vitae (2010b)

¹³⁹ www.rin.ac.uk/

- support the development of effective policies and practices for researchers, institutions, funders, information professionals and everyone who is involved in the information landscape

There are other training and development organisations providing events in many of the areas identified in this study as evidenced by the numerous workshops, webcasts, conferences and other events advertised on various professional lists and the organisations' websites. Recent examples include a half-day workshop on data management in the Humanities which considered how institutions might "address the growing need to train researchers to better organise their data and ensure it can be retrieved again in the future"¹⁴⁰, a workshop on intellectual property rights¹⁴¹, and an international conference on digital curation¹⁴².

These events are often expensive both in terms of fees, travel and accommodation, and so only a few members of staff, if any, are able to attend. They also take staff away from the workplace. As well as events, some organisations provide tools that Subject Librarians could use for self-directed independent learning, for example the DCC has a Data Management planning tool, DMP Online¹⁴³ that assists in the preparation of basic plans at the funding application stage; and helps to build and maintain a more detailed DMP during a project's lifetime. Charlotte Mecklenburg Library has a project, 'Learning 2.0 Program'¹⁴⁴ that is designed to encourage staff to explore new technologies and reward them for doing 23 Things that will expand their knowledge of the Internet and Web 2.0. Other Learning 2.0 programmes are duplicating or modifying this programme for their organisation. Several libraries (for example, Oxford, Cambridge, Limerick, Westminster and Warwick) have adopted the 23 Things programme to enable staff to develop their Web 2.0 skills.

5.3 Schools of Library and Information Studies

The UK Schools of Library and Information Studies and a sample of European, North America and Australian Schools were invited to complete a survey to identify training opportunities and gaps for new entrants, and to explore collaborative opportunities between the Schools and RLUK to ensure new professionals are equipped to support the current and emerging research environment. 12 responses

¹⁴⁰ http://sudamih.oucs.ox.ac.uk/training_workshop.xml

¹⁴¹ www.jisc.ac.uk/events/2010/09/scaworkshopipr.aspx

¹⁴² www.dcc.ac.uk/events/conferences/6th-international-digital-curation-conference

¹⁴³ <http://dmponline.hatii.arts.gla.ac.uk/pages/instructions>

¹⁴⁴ <http://plcmcl2-about.blogspot.com/>

were received from the UK, 4 from the USA, 3 from Australia, 2 from Canada, and 1 from mainland Europe. A list of the Schools who responded is given in Section 1.3.

The respondents were asked to contribute information about the extent to which their students taking academic library options on postgraduate courses acquire knowledge and skills in a number of areas identified in Chapter 3. Skills and knowledge likely to be acquired elsewhere were omitted e.g. knowledge of current and changing local research interests. The full results are given in Table 5 (page 109).

The extent to which postgraduate students are acquiring knowledge and skills in the areas assessed to be essential by the majority of respondents to the gap survey (and which were included in the survey of Schools of Library and Information Studies) is as follows:

- Excellent knowledge of bibliographic and other finding tools in the discipline/subject (36% high level of expertise/practical ability; 27% good understanding)
- Excellent skills to design information literacy training (both face to face and online) to meet the identified needs of different types of researchers (36% high level of expertise/practical ability; 36% good understanding)
- Outstanding skills in information discovery, literature searching etc. (82% high level of expertise/practical ability; 18% good understanding)
- Knowledge to advise on citing and referencing, and the use of bibliographic management software (55% high level of expertise/practical ability; 36% good understanding)
- Ability to pro-actively advise on and market appropriate library services to researchers (36% high level of expertise/practical ability; 36% good understanding)
- Good knowledge of data sources available in the discipline/subject (9% high level of expertise/practical ability; 36% good understanding)

In all but one (good knowledge of data sources available in the discipline/subject) the majority of Library Schools are covering these topics in their curricula, although the level of expertise acquired is not high in all areas.

The extent to which the postgraduate students are acquiring the knowledge and skills for which Subject Librarians identified a high skills gap are shown below:

- Ability to advise on preserving research outputs (9% high level of expertise/practical ability; 36% good understanding)
- Knowledge to advise on data management and curation, including ingest, discovery, access, dissemination, preservation, and portability (27% high level of expertise/practical ability; 27% good understanding)

- Knowledge to support researchers in complying with the various mandates of funders, including open access requirements (0% high level of expertise/practical ability; 9% good understanding)
- Knowledge to advise on potential data manipulation tools used in the discipline/subject (9% high level of expertise/practical ability; 27% good understanding)
- Knowledge to advise on data mining (0% high level of expertise/practical ability; 27% good understanding)
- Knowledge to advocate, and advise on, the use of metadata (45% high level of expertise/practical ability; 55% good understanding)
- Ability to advise on the preservation of project records e.g. correspondence (9% high level of expertise/practical ability; 36% good understanding)
- Knowledge of sources of research funding to assist researchers to identify potential funders (0% high level of expertise/practical ability; 9% good understanding)
- Skills to develop metadata schema, and advise on discipline/subject standards and practices, for individual research projects (27% high level of expertise/practical ability; 55% good understanding)

These results suggest that new entrants to the workplace will have a relatively high level of understanding or expertise in some of these areas, but will still enter the workplace with a high skills gap in the areas of:

- supporting researchers in complying with the various mandates of funders, including open access requirements
- advising on potential data manipulation tools used in the discipline/subject
- advising on data mining
- knowledge of sources of research funding to assist researchers to identify potential funders

A respondent from Australia observed that the survey highlights a key area that is lacking in LIS higher education in Australia. They explain that they are restricted to a great extent by the main accrediting body which leaves little room in the curriculum for research-focused librarians, although they would like to see more focus on this growing and important area. One of the UK Schools makes the similar observation that “There is potential for collaboration outside those aspects of course content that are specified by CILIP (the latter aspects being common to all accredited courses). However the scope for practical elements would be limited by the need to focus on academic principles rather than specific guidance”.

The UK Schools were asked what, if any, opportunities they can envisage for working with RLUK to ensure new professionals are equipped to support the current and emerging research environment. Several expressed an interest in working with RLUK. For example, the respondent from the Humanities Advanced Technologies & Information Institute (HATII) at the University of Glasgow said

they would be enthusiastic to work with RLUK to support training in the current and emerging research environment, but would require mechanisms to develop joint activities. Thames Valley University would be open to respond to initiatives that might be proposed. Interestingly they suggest it may be their Masters in Information Systems, Computer Science, Network and Mobile Computing and Interactive Software Design offered in the School of Computing that could contribute resources to RLUK initiatives, such as research data management and data mining. The respondent from the Bristol Institute of Technology, at UWE, would also welcome a dialogue with RLUK on curriculum development. They also highlighted a proposal for a Master's level subject benchmark through the British Association for Information and Library Education and Research (BAILER) and the possibility that RLUK could contribute to it.

Participating libraries were asked in the original survey how well equipped they feel recent 'library school' graduates are to support researchers effectively and what might be done to improve their education in this area. Several respondents acknowledged that their responses were impressionistic rather than based on close observation. A few respondents noted that recruitment constraints mean they have not employed a library school graduate within the last five years, and some pointed out that they would be unlikely to appoint a recent graduate to a direct research support role. This is echoed by the respondent from Canterbury NZ who suggests that the desired skills set is derived from experience which is time-based, and the application of a sound broad general knowledge.

One common concern is that the Schools are producing generalists and not the specialists needed to support researchers, and that a single postgraduate course may not be able to provide all the 'different flavours of librarianship' in a year. The respondent from Durham commented that Library School students are often taught skills which are generic to the whole profession, even though many come in knowing which sector they want to work in post-qualification. A better approach might be to provide a general introduction to the profession in Term 1, with more specific sectoral information in Term 2. A respondent from one of the American participating libraries suggests that the level of knowledge of new Library School graduates depends on the individual and on the graduate programme, but that many graduates nonetheless seem to be poorly prepared for the workplace.

One Australian LIS School respondent confirmed some of these observations and reported that they offer "a generic library and information science degree. We do not have majors or specialisations in areas such as academic librarianship, public libraries, special or corporate libraries etc. My students will come into my degree with no set idea or intent for their future career. Many are looking to be inspired. My goal is to ensure that they graduate as well rounded information professionals who are able to successfully function

in whatever context they find themselves employed i.e. not just academic". Similarly, a UK School says "Our degree has no options...It is very dangerous in a degree aimed at providing entry to multiple sectors to concentrate on the limited set of needs of one group/sector...if we accommodated every need such as this we would have no room to teach the core body of knowledge". They suggest that a guest lecture that provides an overview of such needs would be useful. Even at a School where postgraduate students are studying in distance learning mode and may already be working in an academic environment and so have a special interest in that sector, course content is, for the most part, generic. There is seldom reference to academic libraries/research institutions except through examples intended to illustrate broad principles that would equally apply to other environments.

One respondent from a participating library believes that specialist courses are required, including one for HE librarians, and that there needs to be a "sector wide analysis of the skills required and organisations like RLUK or SCOUNL need to either negotiate with library schools or perhaps commission bespoke courses". A similar example to this comes from New Zealand. CONZUL has been involved with the Victoria University of Wellington and their curriculum development, and the MLIS programme recently morphed into an MIS which gives graduates access to a broader range of options during their study programme. Similarly, Purdue have been working with the University of Illinois Graduate School of Library and Information Science through consultation and collaboration in developing aspects of their data curation curriculum, and by giving presentations (e.g. at their Summer Data Institute).

Some respondents identified topics that they think new graduates are being well equipped with, including: reference interviewing techniques; skills in communication, listening, evaluation, analysing and technical writing. The respondent from Purdue observed that the few 'recent' graduates on their staff have "demonstrated 'fluency' in new modes of scholarly communication, collection development, and information literacy. They have shown themselves to be remarkably flexible in picking up new skills and knowledge related to research data curation/management..." One UK respondent noted that the Schools might provide students with a better understanding of the changing nature of the research enterprise, and another that it is their understanding that research support is only covered to a limited degree, and that data curation is missing from the curriculum. The Tilburg respondent does not feel that Library School graduates are very well equipped to support researchers effectively, and thinks that much of it is still 'old school', although he does see some competency in dealing with social media, wikis, blogs etc.

There were mixed messages about teaching skills. The respondent from Toronto has found that, generally speaking, their recent recruits have had excellent teaching skills. Conversely, Cardiff reports that "In general we feel that library schools do not tend to equip students well for their teaching role". A

respondent suggests that many graduates nonetheless seem to be poorly prepared for the workplace. He thinks there may be too much focus on the latest interfaces and gadgets, and not enough emphasis on the history of research tools and their underlying structure. He also argues that the lack of exposure given by many Library Schools to traditional cataloguing is a little disturbing.

5.4 Commentary

The picture that emerges is that training and development events are organised or attended by Subject Librarians largely based on needs identified at the annual personal professional development review. To some extent the organisation of events in-house and attendance externally is somewhat ad hoc rather than part of a structured programme designed to ensure that new skills are acquired by Subject Librarians as strategic decisions are taken to expand or change their role. Respondents made limited reference to the level of skill or knowledge Subject Librarians are expected to acquire at an event, e.g. whether gaining awareness or understanding of a topic is sufficient, or whether they need to be able to apply a skill proficiently. Many of the events organised or attended are workshops or conferences and it is unlikely that staff will obtain practical technical skills at such events. There is also a preponderance of this type of group event and very little mention was made of Subject Librarians undertaking any structured, independent, self-directed learning based around the many freely available resources available on the Internet. A training needs analysis undertaken for the OU¹⁴⁵ found little information in the literature and from comparator institutions that gave guidance or shared experience for designing and delivering a programme of training and development activities that would address these skills gaps of librarians engaged directly with academic colleagues and the learning and teaching process. In common with that project, this study also found little guidance or shared experience for designing and delivering a programme of training and development activities that will address the skills gaps. In that study, there was a view among the Learning and Teaching Librarians that while one-off training courses and similar activities can be useful, what is critical is the ability to put into practice the lessons learnt and apply them as soon as possible and regularly.

The majority of the training and development activities reported in the survey of libraries centred around 'core' skills and the more traditional methods of supporting research, although events designed to improve the skills of Subject Librarians and their capability to support research in new ways are being provided, albeit on a lesser scale. One respondent made a personal observation that Subject Librarians have focussed extensively on supporting learning and teaching over the last decade, and so there has

¹⁴⁵ Open University (2009a)

been a lot of emphasis on information literacy, developing teaching skills, and skills in instructional design. Also, support for research has been less innovative and has centred upon collections. During the last couple of years, however, she thinks the pendulum has clearly swung. She observes that “Many Subject Librarians are keen to take up these new challenges but it may take some careful change management for all Subject Librarians to embrace the new domains of knowledge and activity that they are now called upon to undertake”.

The small number of respondents to the survey sent to training providers makes it difficult to assess the current situation with confidence. Nonetheless it does appear that there may be limited opportunities to acquire many of the new skills and knowledge areas in which Subject Librarians identify a skills gap, from a core group of large providers. It is more likely that opportunities will need to be carefully sourced from a very wide range of providers, often outside the normal ‘library’ arena. Given that greater emphasis is being placed at this time on developing many of the same skills for researchers as well, and that organisations, such as Vitae, are providing or promoting events to address these, there would seem to be opportunities for Subject Librarians to learn alongside their clients. There is also considerable scope for RLUK to work in partnership with appropriate training providers to develop the training and development programmes that are increasingly going to be needed by Subject Librarians who support researchers.

All of the skills and knowledge areas are currently covered to a greater or lesser extent in the Library Schools. On reflection, it would have been interesting to ask whether they have plans to raise the level of student expertise over the next 1 - 3 years. As the respondent from Cardiff said, “The impression is that the current output matches the perceived current need, and is not stretching to the future requirement...” The Schools are providing more of a generic offering, and have little scope for producing graduates with the level of skills and knowledge to become Subject Librarians able to effectively support researchers. Many of the Schools in the UK are, however, interested in entering into a dialogue with RLUK to explore the issues. One possibility is to discuss the potential for the Schools to focus more on continuing professional development in areas such as data management given that the rate at which new skills enter the workforce through recruitment of new graduates is too slow for the pace at which academic libraries need to change. A challenge for the Schools may be to upskill their own teaching staff, or outsource the teaching to appropriately skilled and experienced professionals.

6 Alternative models of information support for researchers

An objective of the study was to review alternative models of information support for researchers. Alternative routes to providing 'library' support was explored in Chapter 4 which looked at the models libraries are using, including the 'classical' method of deploying Subject Librarians, the emerging model of greater engagement and embedding them, and a more hybrid model of support in which new library posts are being created. This chapter will focus on other approaches that may bypass traditional 'library' support and implications for the profession.

There are many examples of University posts, departments and initiatives with responsibilities for supporting the information and related needs of researchers. Examples include copyright offices, institutional repository staff, publications services, and researcher training programmes. At Edinburgh, the University's Institute of Academic Development runs a researchers' development programme that brings together transferable skills and HR-related career development for researchers, integrating researcher support along the career development path from research student to research professional. At Northumbria, a project, DATUM for Health: Research data management training for health studies¹⁴⁶, has been launched which will promote research data management skills for postgraduate research students through a specially-developed training programme. The project is led by the School of Computing, Engineering and Information Sciences, in partnership the School of Health, Community and Education Studies and The Graduate School, with the DCC and the Digital Preservation Coalition as external partners. The project will design, pilot and evaluate a training programme as an integral part of a doctoral training programme, and aims to provide other HEIs with a model for research data management skills training and make recommendations for its sustainability and infrastructure requirements.

The Law Research Service at Melbourne Law School is an interesting model. Discrete research requests from academic staff and academic visitors are completed by law student research assistants, under the supervision of the Law Research Service Manager. They accept research tasks of up to 20 hours on all topics, including domestic, foreign, interdisciplinary and comparative law research. For more substantial research tasks, they can provide training and guidance to academic staff and their personal research assistants. They maintain that by undertaking discrete research tasks and facilitating timely access to relevant information for the purposes of research and knowledge transfer, and freeing staff time to think and write, the Service contributes to the quality, quantity and impact of the Law School's faculty publications. The service is funded by the Law School.

¹⁴⁶ www.northumbria.ac.uk/sd/academic/ceis/re/isrc/themes/rmarea/datum/

It could be argued that law and health/medicine are not typical areas, both having a very precise and mission critical need for information, and both having been served by library and information staff highly specialised in the discipline for decades. But a picture of libraries being by-passed as the primary source of information support and services is now, it would seem, starting to emerge; and it may seem to end users that libraries are less relevant in the age of electronic delivery where who provides access to what resources is not clear. The RIN/BL report observed, "...many life science researchers have removed themselves from the mainstream library user population. They do not even use the library catalogue... Conventional university library facilities rank low as a vehicle for accessing published information. The traditional role of professional information intermediaries has been largely replaced by direct access to online resources, with heavy reliance upon Google to identify them"¹⁴⁷.

Some commercial services are offering added value tools that their customers can use. Ovid, for example, has features explicitly designed to "help streamline key tasks within the research process", including results management features, citation management options, and a dedicated area for creating and managing research projects, and saving articles, citations, images etc.

Attention has already been drawn in Chapter 5 to the fact that there are other organisations providing advice and activities for researchers in areas which Subject Librarians also provide support and services. Vitae is a notable example in the UK. In addition to a national team of staff, Vitae has eight regional hubs located in universities. Vitae provide "resources, advice, information and fora for individual postgraduate researchers and members of research staff who are interested in their professional development and careers"¹⁴⁸ and its activities include a dedicated researchers' portal with information, news and opportunities; and a programme of national courses and activities. Vitae also works with UK HEIs to "embed professional and career development in the research environment"¹⁴⁹, and its services include

- opportunities for the sector to share approaches, including a database of practice
- enabling communities to share areas of common interest in online fora and workspaces
- a variety of resources for organisers of researcher development programmes ranging from skills sessions to career planning, including for example the effective researcher programme
- piloting innovative approaches to personal, professional and career development
- publishing research and reviews

¹⁴⁷ Research Information Network and the British Library (2009)

¹⁴⁸ www.vitae.ac.uk/policy-practice/1420/How-is-Vitae-structured.html

¹⁴⁹ www.vitae.ac.uk/policy-practice/1710/What-does-Vitae-do.html

Two alternative models that universities might consider, particularly in the current economic climate are shared services and outsourcing. In a recent ARL study designed to scope future research library scenarios participants observed that “many current services, activities and assets in research libraries are not unique to the organization and are duplicated by many other research libraries”. This led them to question how research libraries might create a means to combine efforts to gain the benefits of economies of scale. The report observes that “All of the scenarios evoke an interesting strategic conversation on what opportunities exist to effectively collaborate and network with other research libraries...Opportunities for cross-pollinating research activities and the potential for shared endeavours are also viable strategies”¹⁵⁰.

There are already examples in the UK of shared services or partnership working to support researchers, for example UK Research Reserve (UKRR)¹⁵¹ and (at a more local level) the East Midland Research Support Group. This group of research support staff from University Libraries is investigating how they can work together to enhance the information literacy skills of research staff. A survey and a literature review on the theme of researchers’ information skills needs have been carried out and members are developing re-usable online tutorials (informed by the findings of this initial research) that can be shared and tailored to meet local needs. It may be that more economies could be made in some areas of support provided by Subject Librarians, by developing more shared services, or expanding the role of existing ones such as the Digital Curation Centre. In a recent SCONUL survey on Shared Services¹⁵² over 60% of the respondents are involved in, or planning some form of shared services activity and showed strong and widespread interest in them. Libraries have a long history of contracting out some of their processes, for example book processing, and electronic resource negotiations and licensing. Finally, there are a growing number of local authorities, e.g. Hounslow, Luton and Slough that have begun to contract out library services to either other local authorities or private companies¹⁵³. In a recent CIBER survey¹⁵⁴ of 835 libraries in a range of sectors worldwide 10.2% showed an interest in outsourcing as a way of dealing with the financial pressures confronting them. This is another potential model that could be used to provide services by Subject Librarians to support research, but no evidence emerged during the study that any institutions are considering this option.

¹⁵⁰ Association of Research Libraries (2010a)

¹⁵¹ www.ukrr.ac.uk/

¹⁵² SCONUL (2009)

¹⁵³ Buckley-Owen (2010)

¹⁵⁴ CIBER (2009)

6.1 Commentary

In 2010, ARL and Stratus conducted a series of interviews, focus groups, and surveyed their members and other external thinkers on the future of research libraries and the strategic challenges they face. One area of debate that emerged was about new competitors and substitutes that will emerge for the services currently offered by research libraries. As we have seen, there are already a variety of alternative models, indeed sources, of support and services that researchers can turn to in order to meet their information and related needs, and research libraries and their Subject Librarians face the challenge of ensuring that they remain relevant and visible in this environment of diverse support and service provision.

Gabridge makes the point in relation to data curation support that “First, libraries will need to build data curation systems in collaboration with other university partners; and second, libraries will need to create credible and valuable data services using the combined efforts of subject liaisons, other library staff, and drawing upon applications built on the infrastructure”¹⁵⁵. Libraries will need to make every effort to collaborate (liaise seems to be a very passive and inadequate concept in this context) with these ‘competitors’ who are also potential partners, to change the challenge they present into an opportunity, and to ensure the best possible support for researchers and the best value for money for their institutions.

¹⁵⁵ Gabridge (2009)

7 Conclusion

“As mature organizations, research libraries recognize the challenge associated with truly transforming their processes and services”¹⁵⁶. Part of this challenge is to examine the support and services clients actually need in a rapidly changing environment, and to ensure that relevant, cost effective, and high quality support and services are provided by a competent and well-trained workforce. The current study was commissioned by RLUK to map the information needs of researchers and tasks undertaken by Subject Librarians, information specialist and liaison staff, in order to develop the skills sets of existing staff and recruit new staff to ensure they meet the needs of a constantly changing research environment. This chapter reflects on the findings of the study that will, hopefully, enable RLUK and its members to plan the best possible fit between assessed needs and present and future staffing profiles.

In collating and summarizing the information brought together under the terms of reference of the study the report has aimed to deliver the following benefits to specific stakeholder groups:

To Subject Librarians

- A scoping of activities required to support research will enable them to identify opportunities for new roles, to extend portfolios and stretch post holders
- A skills analysis enabling staff to identify skills gaps and training needs

To Directors of Library and Information Services in RLUK and other research and university libraries

- A scoping of activities that can be used for role development, informing planning and assessment of what staff currently offer, what can be abandoned, and what needs to be developed in line with institutional strategies - this in turn can inform structural reviews of LIS services.
- A skills analysis that can inform institutional training programmes
- A customisable job description and person specification template that can be tailored to meet the needs of individual institutions

To Pro-Vice Chancellors for Research/Research Managers

- A scoping of activities will enable research managers to become more fully aware of what can be offered by Subject Librarians and other library staff, rather than by seeking support from alternative routes/sources

To Library Schools

- Opportunities for Library Schools to develop courses for new professionals that are more closely aligned to the needs of library managers to ensure new entrants to the profession have the appropriate skills sets to support a constantly changing research environment.

¹⁵⁶ Association of Research Libraries (2010a)

- Opportunities for potential partnership work with RLUK to develop courses aimed at developing existing professionals.

To professional bodies and training providers

- Highlight opportunities for RLUK to work more closely with CILIP.
- Opportunities for RLUK to work with training providers to develop training programmes for staff.

Libraries, and their staff (including Subject Librarians) who have a responsibility to support and provide services for researchers, face a huge challenge that could be turned into a huge opportunity. The literature about researchers' information and related needs and behaviour, points to a trend of them by-passing the library as a source of support and services. As Cervone says, the authors of a recent report from OCLC "paint a rather bleak picture for libraries as part of the research process" and "... discuss and reemphasize many of the points that have been made in several recent studies"¹⁵⁷.

The OCLC Research report¹⁵⁸ paints a picture of researchers by-passing the tools provided by the university in favour of online tools, commercial services related to their discipline, and search engines. It also found that many researchers "flounder in a disorganized and rising accumulation of useful findings that may be lost or unavailable when conducting future research" despite the research data curation services being offered. Gabridge makes similar points, "In science and engineering disciplines, faculty do not often see librarians as being equipped to help them solve their data problems: they are more likely to approach information technology departments for such help"¹⁵⁹.

"Researchers have no perception of the huge internal transformation most libraries have undergone in the conversion to digital access. Researchers do not realize what expertise librarians have to offer their users, are uninformed about services offered, and have little idea what the library might do in the future..Researchers require practical evidence of direct value of research tools and services. Academic libraries can support research by developing and aggregating discipline-based tools, providing customized services, and emphasizing user-centered services"

Kroll and Forsman (2010)

Kroll and Forsman forcefully describe the challenge faced by libraries, "Researchers have no perception of the huge internal transformation most libraries have undergone in the conversion to digital access. Researchers do not realize what expertise librarians have to offer their users, are uninformed about services offered, and have little idea what the library might do in the future. Researchers require practical evidence of direct value of research tools and services. Academic libraries can support research by

¹⁵⁷ Cervone (2010)

¹⁵⁸ Kroll and Forsman (2010)

¹⁵⁹ Gabridge (2009)

developing and aggregating discipline-based tools, providing customized services, and emphasizing user-centered services”¹⁶⁰.

Libraries will need to respond to this challenge by developing a unique role in consultation with their institution for the part they will play in the support of meeting researchers’ information and related needs. The research environment is changing, driven not least by the power of technology to transform the way they work. Libraries are largely in uncharted territory, and have the chance to draw a new map of support and services for researchers. As the recent ARL report on its scenario planning exercise says, “Transforming research libraries is a challenging process. It requires libraries to understand what will differentiate them and make them valued in the future, how they can change and adapt to maintain relevancy in a content space that is continuously changing.”¹⁶¹ The report also says, “Each scenario highlights in a different way the powerful advantages that will accrue to research libraries that effectively focus and specialize in areas of content and/or services that build off of their existing distinctive competencies”.

This investigation has highlighted an exciting and demanding new role for Subject Librarians in supporting the information and research data needs of researchers that embraces a range of new and modernised services and support, and that builds on their existing traditional and valued role. A shift can be seen which takes Subject Librarians into a world beyond information discovery and management, collection development and information literacy training, to one in which they play a much greater part in the research process and in particular in the management, curation and preservation of research data, and in scholarly communication and the effective dissemination of research outputs. To be able to fully deliver this new role Subject Librarians need to have the skills and knowledge required to perform it expertly and with confidence. This study has uncovered a skills gap in a number of key areas which will need to be bridged through training and development of the existing workforce, and the recruitment of new staff with the necessary skills and knowledge. No obvious sources for the provision of this training and development were uncovered, and it is likely that new partnerships between research libraries, RLUK and various training providers will need to be forged to fully capitalise on the deployment of those people that already have the required skills and are able to impart them to others. The demand for this enhanced role for Subject Librarians is already being felt in research libraries, and is likely to grow considerably over the next 2 - 5 years, unless researchers are forced to look elsewhere because the workforce is not quickly and fully prepared and equipped with the skills and expertise to support them.

¹⁶⁰ Kroll and Forsman (2010)

¹⁶¹ Association of Research Libraries (2010a)

Building on existing competencies may only be part of the picture if research libraries are to continue to provide responsive and relevant support and services to support the information and data management needs of researchers. The support and services research libraries are charged with providing will have to be clearly articulated and their benefits expressed in terms of researchers' needs and how these will be met actively, they will have to be delivered within a timeframe that corresponds to researchers' patterns of work, and they will have to be vigorously and assertively promoted. They will need to ensure they have staff who embrace the role they play and feel confident and skilled to deliver the support and services expected of them, and they will need to do it soon.

Appendix A: Steering Committee

Antony Brewerton (Warwick, Chair)

Sheila Cannell (Edinburgh)

Margaret Coutts (Leeds)

Martin Lewis (Sheffield)

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Digital Curation Blog

<http://digitalcuration.blogspot.com/>

Presentations at Support for e-Research: Filling the Library Skills Gap, a CURL/SCONUL Task Force Workshop 2007

www.nesc.ac.uk/esi/events/770/

Appendix C: Survey questionnaire

RLUK investigation into the skills sets of 'subject librarian' staff required to support the current and future information needs of researchers (2010)

Thank you for agreeing to take part in this study for RLUK. The questions below are designed to collect information from you as painlessly as possible. We have used the term 'subject librarian' to label the primary role we are investigating, although we recognise that institutions will use a variety of job titles. We don't want to prescribe what functions and tasks might constitute support for researchers but examples could include: collection development; digitisation programmes; information discovery; information literacy training; data storage, management and preservation; repository management; scholarly publishing advice; and research quality audit advice and support.

Please provide additional or different information if you think it is pertinent to the area of questioning even if we have not asked the question. If your answer to a question is already covered in a pre-existing document we would be grateful if you would append a copy, copy and paste the appropriate text, or provide an url.

If you would prefer to give your responses on the telephone please e-mail me at mjauckland@mac.com to arrange a date and time. All data collected will be held securely. Please indicate clearly any information that you would prefer to be treated anonymously.

Respondent (institutional name):

- 1 Please provide a sample copy of current job descriptions for any 'library' staff who directly support researchers (e.g. dissertation researchers, PhD students, research assistants, faculty researchers, professors)
- 2 Please provide a copy of your organisation chart showing where these posts sit
- 3 Please elaborate on how your 'subject librarians' engage with supporting researchers in meeting their information needs
- 4 What other library posts do you have that directly support researchers, and what responsibilities do they have?
- 5 How do you anticipate these posts and/or responsibilities changing in the future? What is your vision for 'library' support for researchers in the future?
- 6 Please give details of any other model of researcher support you or your institution provide or may provide in the future
- 7 Please provide information about the skills required by your 'subject librarians' and other relevant staff to effectively support researchers in meeting their information needs, and the outputs of any a recent analysis of these
- 8 In what way do you think these skills will/should change in the future?
- 9 Please provide information about the current training and development needs of your 'subject librarians' with respect to supporting researchers, and the outputs of any a recent analysis of these
- 10 Please provide information about any training events (programmes, providers etc.) that you have held to enable your 'subject librarians' to support researchers more effectively

- 11 Please provide information about any likely future training needs of your 'subject librarians' with respect to supporting researchers, and the outputs of any recent analysis of these
- 12 How well equipped are recent 'library school' graduates to effectively support researchers? What could be done to improve their education in this area?
- 13 What, if any, alternative routes to support for researchers that might reasonably fall within the remit of the library, do you think may emerge in the future and may or may not by-pass traditional 'library' support. Should libraries embrace these or see them as a threat, and what are the implications for professional library staff?
- 14 Finally, is there anything else you would like to add that you think might be helpful to our study?

Thank you for taking the time to respond

Appendix D: Checklist of job description and person specification items

The table below shows the key current and emerging roles and responsibilities needed by Subject Librarians in support of research, and some of the related skills, knowledge, qualifications and experience required to deliver these. It is not a template, but rather a checklist that libraries can draw upon and tailor in the light of their own local requirements and practices. The checklist is drawn from the findings of the study, including job descriptions and person specifications provided by participating libraries

The checklist focuses almost entirely on the element of a Subject Librarian's role that relates specifically to research support, although some more generic or 'core' skills are included at the end as exemplars of other items that might appear in a Subject Librarian's job description and person specification.

Potential roles and responsibilities	Essential <u>OR</u> desirable qualifications, proven skills, knowledge and experience
<i>Engage effectively with the research community by:</i>	
<ul style="list-style-type: none"> identifying the needs, working methods and expectations of the research community, ensuring a thorough understanding of the research process and the range of research activities undertaken. 	<p>Understanding of, and empathy with, researchers of various levels</p> <p>Understanding of the research life cycle and its various stages</p>
<ul style="list-style-type: none"> understanding current and changing local research interests 	<p>Understanding of research issues in the [local e.g. UK} Higher Education sector and a broad general knowledge of current issues and developments in research globally.</p> <p>Awareness of current and changing local research interests</p> <p>Awareness and ability to recognise the value of services and opportunities provided by national and international collaborative initiatives and agencies such as UKRR, RIN, and RLUK</p>
<ul style="list-style-type: none"> understanding individual researcher/project needs 	<p>Understanding of a typical researcher's experience, including their workflow, and how researchers access and use information, within a discipline/subject and at different stages of the researcher's career</p> <p>Ability to gain an appreciation of individual researcher/project needs, including effective listening skills</p>
<ul style="list-style-type: none"> develop and maintain relationships with the research community in the relevant subject through communication, needs assessment, and participation in activities, including relevant committees and meetings and informal networks and one-to-one liaison 	<p>Excellent communication, promotion, team-working and political skills</p> <p>Ability to develop successful partnerships and relationships with clients and colleagues at all levels</p> <p>Ability to manage client relationships</p> <p>Ability to pro-actively advise on and market</p>

<ul style="list-style-type: none"> • pro-actively advising on and marketing appropriate library services, and identifying a role for the library in projects • be the key contact for communication with academic and research staff and students; promoting and explaining Library policies, strategies and services, informing and consulting colleagues about service developments, explaining the rationale for decisions and changes and managing user expectations 	<p>appropriate library services to researchers</p> <p>Ability to develop highly effective relationships</p> <p>Able to input into and influence the research community's decision-making in library/information/research data management matters</p> <p>In-depth understanding of the subject discipline giving the ability to communicate effectively with researchers at a high level</p>
<ul style="list-style-type: none"> • develop and deliver programmes of library and information skills and data management training for researchers, and to amend existing programmes and develop new ones to meet changing user needs and the changing information, data and research environments • develop support materials, including online tutorials 	<p>Excellent skills to design research information skills and data management training (both face-to-face and online) to meet the identified and evolving needs of different types of researchers</p>
<ul style="list-style-type: none"> • work with research support services and other relevant stakeholder groups and to develop and market services accordingly 	<p>Excellent communication, promotion, team-working and political skills</p> <p>Ability to develop successful partnerships and relationships with clients and colleagues at all levels</p> <p>Ability to manage client relationships</p>
<p><i>Provide direct targeted, tailored services and support to researchers and research team by:</i></p>	<p><i>Proven skills and knowledge</i></p>
<ul style="list-style-type: none"> • acquiring and maintaining detailed knowledge of the information and data resources and sources in the subject area, and be the Library's expert in this subject area 	<p>Deep knowledge of the discipline/subject</p> <p>Extensive and authoritative knowledge of information resources and sources in a variety of media available to their discipline/subject</p> <p>Knowledge to advise on relevant archive and special collections locally and elsewhere</p> <p>Good knowledge of data sources available in the discipline/subject</p>
<ul style="list-style-type: none"> • provide expert advice for finding specific and relevant information and data easily • undertaking literature searches 	<p>Excellent knowledge of bibliographic, data and other finding tools in the discipline/subject</p> <p>Outstanding skills in information discovery, literature searching etc.</p>
<ul style="list-style-type: none"> • delivering current awareness and SDI services 	<p>Extensive and authoritative knowledge of information resources and sources in a variety of media available to their discipline/subject</p> <p>Ability to use and promote Web 2.0 applications</p>

<ul style="list-style-type: none"> • synthesising, analysing and/or interpreting discovered information and data 	<p>Ability to synthesise, analyse and provide targeted digests of large amounts of information</p>
<ul style="list-style-type: none"> • providing expert advice and training on information management, including advising on citing and referencing, bibliographic management software, and referencing tools 	<p>Sound knowledge to advise and train on information management, including citing and referencing, and the use of bibliographic management software and referencing tools</p> <p>Knowledge to advise on the manipulation and presentation of researchers' information</p>
<ul style="list-style-type: none"> • advising on, and or directly involved in, research data management and curation, including <ul style="list-style-type: none"> ▪ identifying the best home for research data ▪ advising on standards ▪ assisting with the creation of research data management plans ▪ creating organising strategies for research data ▪ collecting and making available research data sets for re-use ▪ devising strategies for preservation 	<p>Sufficient knowledge to advise on data management and curation, including ingest, discovery, access, dissemination, preservation, and portability</p> <p>Knowledge to advise on potential data manipulation tools used in the discipline/subject</p>
<ul style="list-style-type: none"> • advising on, and developing metadata for discovered information and data, collected research data, and outputs 	<p>Knowledge to advocate, and advise on the use of metadata for discovered information and data, collected research data, and outputs</p> <p>Skills to develop metadata schema, and advise on discipline/subject standards and practices, for individual research projects</p>
<ul style="list-style-type: none"> • supporting, and advising on, the use of research communication and collaboration tools 	<p>Awareness of research communication and collaboration tools and of the potential of other communication tools for research use</p> <p>Knowledge of Search Engine Optimisation techniques</p>
<ul style="list-style-type: none"> • participating in research data mining, considering: <ul style="list-style-type: none"> • sources of data suitable for data mining • gathering of data, • copyright issues • analysis of data mining 	<p>Knowledge to advise on data mining, its validity and potential as a research technique</p>
<ul style="list-style-type: none"> • participating in research data mining 	<p>Knowledge to advise on data mining</p>

<ul style="list-style-type: none"> • advising and training on dissemination and publishing options, including scholarly communication and open access, including • promoting sustainable models of scholarly communication • assisting in the development and creation of tools and services to facilitate scholarly communication • advising on use of the institutional repository, and recruiting content for it 	<p>Ability to advise on current trends, best practice and available options in research publication and dissemination methods and models locally, nationally and internationally, including scholarly communication and open-access publishing</p> <p>Knowledge of Search Engine Optimisation techniques</p>
<ul style="list-style-type: none"> • providing specialist support in complying with funders' mandates, e.g. for open access, data management, copyright and intellectual property rights, FOI/data protection 	<p>Sufficient experience to support researchers in complying with the various mandates of funders, including open access requirements</p> <p>Sufficient understanding of author rights, copyright legislation and IP issues, and plagiarism, to advise or refer as appropriate</p>
<ul style="list-style-type: none"> • giving support in preparing for quality assessment exercises, including assisting with the maximisation and ranking of research outputs, and research impact • Provide support and guidance on bibliometrics: <ul style="list-style-type: none"> • Provide advice on how individual researchers can raise their own profile • Advise on the interpretation and use the university could make of citation monitoring and measuring • Advise on the use made by other bodies in research performance management • Advise on datasets available and techniques for normalising 	<p>Good understanding of the national and local research assessment processes, and the requirements of the REF</p> <p>Understanding of research impact factors and performance indicators and how they will be used in the REF, and ability to advise on citation analysis, bibliometrics, etc.</p>
<ul style="list-style-type: none"> • giving advice on the preservation of research projects' data, records and outputs 	<p>Knowledge to advise on the preservation of research projects data, records and outputs (e.g. archives to which to contribute and/or how researchers can maintain their own archives)</p>
<ul style="list-style-type: none"> • assisting with grant applications and funding bids 	<p>Effective research and writing skills</p> <p>Successful track record in making bids for funding locally, nationally or internationally</p>
<ul style="list-style-type: none"> • providing information about the potential of emerging technologies 	<p>Ability to advise on the value and use of emerging technologies, especially mobile technologies, Web 2.0 applications and other communication tools (e.g. Mendeley, Virtual Research Environment)</p>

	Qualifications
	<p>NOTE: Managers may wish to consider the relative importance of a LIS qualification and research experience in a particular subject discipline. Is it preferable to train a qualified librarian in a subject discipline or an experienced researcher in librarianship skills?’</p> <p>EITHER a good honours degree, and possibly also a relevant subject-based post graduate qualification, in relevant subjects, and a professional librarianship/ information science qualification</p> <p>OR a good honours degree, and possibly also a relevant subject-based post graduate qualification, in relevant subjects, and a demonstrable aptitude to acquire the necessary library and related skills required</p> <p>OR a good honours degree, and a professional librarianship/ information science qualification</p> <p>Subject background in relevant subjects or related disciplines, demonstrated through academic degrees, course work, publications, or substantive experience.</p> <p>Understanding of current and emerging trends in the relevant subjects</p> <p>Experience in managing key client relationships in a research and library environment</p> <p>A background in the support of research and research training within a large complex environment.</p> <p>Experience demonstrating success in an appropriate professional or specialist area and/or similar work environment</p> <p>In those areas dealing with foreign language literature, the ability to read and where appropriate communicate in the language concerned, or sufficient experience to be able to provide the services required</p>

Examples of items not specifically related to support for research that might appear a Subject Librarian's job description and person specification.

<ul style="list-style-type: none"> develop and maintain knowledge of current collections in assigned subject areas and be aware of new developments 	Track record of successful collection management and development of research collections
<ul style="list-style-type: none"> participation in relevant university forums and committees, contributing relevant expert and strategic advice and developing a wide range of working relationships, and communicate outcomes 	Outgoing personality, good interpersonal and verbal communication skills, and political skills
<ul style="list-style-type: none"> contribute to the planning of services, strategy and policy 	Ability to provide advice to senior management and to develop, interpret and implement policy
<ul style="list-style-type: none"> manage the relevant content budget 	Ability to manage financial resources
	Effective research, writing and presentation skills
	Commitment to excellent service and innovation
	Commitment to continuing professional development/personal lifelong learning
	Knowledge of current and emerging technologies, including a variety of web applications, learning technologies, productivity software and the ability to apply them in the library services environment.
	A flexible approach to problem-solving
	An ability to work independently: self-managing and able to prioritise own workload to meet agreed objectives
	Track record of effective team-working skills

Appendix E: Feedback from delegates at parallel session about the 'Subject Librarian' study at RLUK Conference 2010

As part of the RLUK Conference 2010 Antony Brewerton ran a workshop session describing the project and findings to date, getting inputs from RLUK members.

The following points were raised in discussion:

Future research support 'Subject Librarian' roles – how would you like to see the role developing?

- We need to increase dialogue to understand user needs
- It is difficult to know what scholarly communications needs are – it is difficult to anticipate needs ...and keep our own skills up-to-date
- Subject Librarians should support researchers in the use of online tools – but it is difficult to keep up
- We need to be providing more skills training, especially for early career researchers
- Include current awareness in activities undertaken
- Subject Librarians need to feed into central university programmes
- We need to provide more advocacy of Open Access
- We need to provide researchers with advice on where to publish, why, impact and bibliometrics
- We need a change in emphasis – not just on finding information – some of these other researcher activities/concerns as well (impact, bibliometrics, etc.)
- We need to develop the library's role as curator
- We will need team work to cover all these new roles
- We need a new name (not 'Subject Librarian') to show new focus
- We need to ensure staff can increase their confidence because they are not subject experts

What should RLUK be doing to help members develop the skills sets of 'Subject Librarians'?

- We need a group to implement the report – a group at the right level (senior colleagues)
- The report should provide objectives to inform group activities
- Subject Librarians will need support with change. Many Subject Librarians have been in post for a long time but they need to change or their posts will seem less relevant, especially given the need to demonstrate value for money
- We need to help the Subject Librarians get *engaged* so they own the process
- We need considerable staff development support to help staff take on new roles
- We need to help Subject Librarians see what new roles will look like on a day-to-day basis
- Where are the Subject Librarians in the structure – Converged services? Multidiscipline teams? We need a team approach but we need to recognise that 'one size does not fit all'
- RLUK should help in the collecting of examples of good practice – developing networks to share good practice and visits programmes
- RLUK should help with the up-skilling of staff generally
- Can we produce a (distant learning) kit for Subject Librarians?
- We need to equip staff so they can take on new roles
- We mustn't 'throw the baby out with the bath water' – we mustn't lose sight of the value Subject Librarians currently bring. How do we balance this with new roles? Who does the established activities?

- We also need to be developing managers so they can lead Subject Librarians successfully
- We also need to think about succession planning
- We can learn from other sectors – e.g. NHS – they look at the horizon for workforce development
- We need planning and we need to be proactive – not reactive
- The profession’s leaders need to show the new role we can offer to our institutions and the difference we can make to research
- We need to demonstrate value – these are the new roles we will be carrying out, these are our successes
- All of this is a big change and very important for the whole Library – it is not just about Subject Librarians – it is really about whole structures, a Library-wide approach

Table 1 How necessary do you think it is for Subject Librarians in your context to have the following skills and knowledge currently and in the future?

	Essential now %	Desirable now %	Unnecessary now %	Essential in the next 2 - 5 years %	Desirable in the next 2 - 5 years %	Unnecessary in the future %
Excellent knowledge of bibliographic and other finding tools in the discipline/subject	82	17	1	82	15	3
Excellent skills to design information literacy training (both face to face and online) to meet the identified needs of different types of researchers	80	18	2	89	10	1
Outstanding skills in information discovery, literature searching etc.	78	21	1	80	17	3
Knowledge to advise on citing and referencing, and the use of bibliographic management software	75	25	0	81	19	0
Ability to pro-actively advise and market appropriate library services to researchers	70	27	2	83	15	2
Good knowledge of data sources available in the discipline/subject	67	33	1	72	28	1
Excellent knowledge of content (in all relevant media) available to their discipline/subject	66	33	1	71	27	2
Awareness of current and changing local research interests	58	38	4	68	31	2
Ability to gain an appreciation of individual researcher/project needs, including effective listening skills	53	42	4	65	33	2
Skills to build strong relationships with researchers and other campus professionals and to establish collaborative partnerships externally, and to manage client relationships	48	48	4	65	33	2

	Essential now %	Desirable now %	Unnecessary now %	Essential in the next 2 - 5 years %	Desirable in the next 2 - 5 years %	Unnecessary in the future %
Understanding of author rights, copyright legislation and IP issues, and plagiarism, to be able to advise or refer as appropriate	48	47	5	62	34	3
Understanding of a typical researcher's experience, including their workflow, and how researchers access and use information, within a discipline/subject and at different stages of the researcher's career	43	52	5	66	31	3
Understanding of research impact factors and performance indicators and how they will be used in the REF, and ability to advise on citation analysis, bibliometrics, etc.	39	52	9	68	28	5
Understanding of the national and local research assessment processes, and the requirements of the REF	38	52	11	57	37	6
Deep knowledge of their discipline/subject	24	55	21	28	48	24
Awareness and ability to recognise the value of services and opportunities provided by national and international collaborative initiatives and agencies such as UKRR, RIN, and RLUK	23	73	4	43	54	2
Ability to advise on current trends, best practice and available options in research publication and dissemination methods and models nationally and internationally, including scholarly communication and open-access publishing	22	70	8	60	38	2
Ability to advise on the value and use of mobile technologies, Web 2.0 and other communication tools to researchers	21	67	12	63	31	6
Knowledge to advise on relevant archive and special collections locally and elsewhere	19	73	7	28	62	10

	Essential now %	Desirable now %	Unnecessary now %	Essential in the next 2 - 5 years %	Desirable in the next 2 - 5 years %	Unnecessary in the future %
Knowledge to advise on the management of researchers' information, including its portability	19	65	15	52	44	5
Ability to synthesise, analyse and provide digests of, 'discovered' information	19	54	28	31	45	24
Skills to participate effectively in research projects, including identifying a role for the library in the project, and assisting with bid and report writing	18	65	17	47	44	9
Sufficient knowledge to support researchers in complying with the various mandates of funders, including open access requirements	16	63	21	40	47	13
Knowledge to advise on data management and curation, including ingest, discovery, access, dissemination, preservation, and portability	16	61	23	48	48	4
Knowledge to advocate, and advise on, the use of metadata	10	73	16	29	64	7
Ability to advise on preserving research outputs	10	66	23	49	43	8
Knowledge of sources of research funding to assist researchers to identify potential funders	8	45	47	21	49	30
Knowledge to advise on potential data manipulation tools used in the discipline/subject	7	63	30	34	57	9
Knowledge to advise on the manipulation and presentation of researchers' information	7	58	34	24	61	15
Knowledge to advise on data mining	3	67	30	33	58	9
Ability to advise on the preservation of project records e.g. correspondence	3	48	48	24	56	20
Skills to develop metadata schema, and advise on discipline/subject standards and practices, for individual research projects	2	57	40	16	65	19

Table 2 The extent to which Subject Librarians personally have the following skills and knowledge

(Arranged in descending order of the number of people who feel they have limited or no skills or knowledge, i.e. the final two columns of the table)

	Considerable skills/knowledge %	Considerable but refresher would be helpful %	Sufficient skills/knowledge %	Sufficient but refresher would be helpful %	Limited skills/knowledge %	None %
Ability to advise on the preservation of project records e.g. correspondence	4	2	3	16	49	25
Knowledge to advise on data mining	2	5	6	13	42	32
Skills to develop metadata schema, and advise on discipline/subject standards and practices, for individual research projects	5	6	8	16	42	22
Knowledge of sources of research funding to assist researchers to identify potential funders	4	4	11	18	37	25
Knowledge to advise on data management and curation, including ingest, discovery, access, dissemination, preservation, and portability	4	14	10	18	47	8
Ability to advise on preserving research outputs	3	6	7	28	40	15
Knowledge to advise on potential data manipulation tools used in the discipline/subject	4	11	10	22	42	12
Knowledge to advocate, and advise on, the use of metadata	7	4	15	20	37	16
Knowledge to support researchers in complying with the various mandates of funders, including open access requirements	8	9	9	22	38	13
Knowledge to advise on the manipulation and presentation of researchers' information	5	8	20	27	31	9
Knowledge to advise on the management of researchers' information, including its portability	7	8	19	28	33	5

	Considerable skills/ knowledge %	Considerable but refresher would be helpful %	Sufficient skills/ knowledge %	Sufficient but refresher would be helpful %	Limited skills/ knowledge %	None %
Skills to participate effectively in research projects, including identifying a role for the library in the project, and assisting with bid and report writing	15	13	12	21	29	9
Ability to advise on current trends, best practice and available options in research publication and dissemination methods and models nationally and internationally, including scholarly communication and open-access publishing	9	16	9	30	27	8
Ability to advise on the value and use of mobile technologies, Web 2.0 and other communication tools (e.g. Mendeley, the Virtual Research Environment) to researchers	8	19	16	23	29	4
Understanding of the national and local research assessment processes, and the requirements of the REF	11	14	17	26	26	5
Ability to synthesise, analyse and provide digests of, 'discovered' information	15	14	22	19	25	6
Awareness and ability to recognise the value of services and opportunities provided by national and international collaborative initiatives and agencies such as UKRR, RIN, and RLUK	9	15	22	29	25	1
Understanding of a typical researcher's experience, including their workflow, and how researchers access and use information, within a discipline/subject and at different stages of the researcher's career	17	16	19	27	21	1
Knowledge to advise on relevant archive and special collections locally and elsewhere	18	20	25	21	16	2
Understanding of research impact factors and performance indicators and how they will be used in the REF, and ability to advise on citation analysis, bibliometrics, etc.	15	14	14	38	14	4

	Considerable skills/ knowledge %	Considerable but refresher would be helpful %	Sufficient skills/ knowledge %	Sufficient but refresher would be helpful %	Limited skills/ knowledge %	None %
Awareness of current and changing local research interests	22	20	20	23	17	0
Understanding of author rights, copyright legislation and IP issues, and plagiarism to advise or refer as appropriate	15	21	22	25	16	0
Knowledge of your discipline/subject	31	25	22	10	13	0
Skills to build strong relationships with researchers other campus professionals and to establish collaborative partnerships externally, and to manage client relationships	27	17	29	16	10	1
Knowledge of data sources available in the discipline/subject	42	22	13	16	7	1
Knowledge to advise on citing and referencing, and the use of bibliographic management software	41	20	22	10	5	1
Ability to pro-actively advise and market appropriate library services to researchers	30	27	23	14	4	1
Knowledge of content (in all relevant media) available to your discipline/subject	34	34	14	14	4	0
Skills to design information literacy training (both face to face and online) to meet the identified needs of different types of researchers	52	25	14	5	4	0
Ability to gain an appreciation of individual researcher/ project needs, including effective listening skills	44	14	26	14	2	0
Knowledge of bibliographic and other finding tools in your discipline/subject	68	17	11	4	1	0
Skills in information discovery, literature searching etc.	64	22	12	2	1	0

Table 3 To what extent do you think Subject Librarians in general currently have the following skills and knowledge?

	Considerable skills/knowledge %	Considerable but refresher would be helpful %	Sufficient skills/knowledge %	Sufficient but refresher would be helpful %	Limited skills/ Knowledge %	None %
Knowledge to advise on data mining	0	6	0	6	71	18
Ability to advise on preserving research outputs	6	6	6	6	71	6
Knowledge of sources of research funding to assist researchers to identify potential funders	6	12	0	6	53	24
Knowledge to advise on data management and curation, including ingest, discovery, access, dissemination, preservation, and portability	0	12	6	6	59	18
Skills to develop metadata schema, and advise on discipline/subject standards and practices, for individual research projects	6	12	6	6	47	24
Ability to advise on the preservation of project records e.g. correspondence	6	6	6	12	41	29
Knowledge to advise on potential data manipulation tools used in the discipline/subject	0	12	24	6	41	18
Knowledge to advise on the management of researchers' information, including its portability	0	6	18	18	53	6
Knowledge to advise on the manipulation and presentation of researchers' information	6	12	18	6	47	12
Knowledge to support researchers in complying with the various mandates of funders, including open access requirements	6	12	6	18	41	18
Understanding of a typical researcher's experience, including their workflow, and how researchers access and use information, within a discipline/subject and at different stages of the researcher's career	6	18	12	12	41	12

	Considerable skills/ knowledge %	Considerable but refresher would be helpful %	Sufficient skills/ knowledge %	Sufficient but refresher would be helpful %	Limited skills/ Knowledge %	None %
Ability to advise on the value and use of mobile technologies, Web 2.0 and other communication tools (e.g. Mendeley, the Virtual Research Environment) to researchers	12	18	0	24	41	6
Skills to participate effectively in research projects, including identifying a role for the library in the project, and assisting with bid and report writing	12	12	18	12	41	6
Ability to advise on current trends, best practice and available options in research publication and dissemination methods and models nationally and internationally, including scholarly communication and open-access publishing	6	12	18	24	35	6
Ability to synthesise, analyse and provide digests of, 'discovered' information	6	12	18	24	35	6
Understanding of research impact factors and performance indicators and how they will be used in the REF, and ability to advise on citation analysis, bibliometrics, etc.	6	29	0	24	29	12
Understanding of the national and local research assessment processes, and the requirements of the REF	6	29	0	29	24	12
Awareness and ability to recognise the value of services and opportunities provided by national and international collaborative initiatives and agencies such as UKRR, RIN, and RLUK	6	18	12	35	24	6
Knowledge to advocate, and advise on, the use of metadata	12	12	12	35	18	12
Knowledge to advise on relevant archive and special collections locally and elsewhere	18	24	12	24	18	6

	Considerable skills/knowledge %	Considerable but refresher would be helpful %	Sufficient skills/knowledge %	Sufficient but refresher would be helpful %	Limited skills/Knowledge %	None %
Ability to gain an appreciation of individual researcher/project needs, including effective listening skills	18	24	18	24	6	12
Awareness of current and changing local research interests	0	35	24	24	12	6
Knowledge of data sources available in the discipline/subject	35	41	0	6	12	6
Understanding of author rights, copyright legislation and IP issues, and plagiarism to advise or refer as appropriate	12	24	0	47	12	6
Knowledge to advise on citing and referencing, and the use of bibliographic management software	41	41	6	0	6	6
Skills to build strong relationships with researchers other campus professionals and to establish collaborative partnerships externally, and to manage client relationships	0	35	18	35	6	6
Ability to pro-actively advise and market appropriate library services to researchers	24	35	18	18	0	6
Knowledge of bibliographic and other finding tools in their discipline/subject	76	12	6	0	0	6
Knowledge of content (in all relevant media) available to their discipline/subject	29	47	12	6	0	6
Knowledge of their discipline/subject	53	12	29	0	0	6
Skills to design information literacy training (both face to face and online) to meet the identified needs of different types of researchers	24	59	12	0	0	6
Skills in information discovery, literature searching etc.	71	18	6	0	0	6

Table 4 The extent to which the trainers provide, or could provide, training in the following areas

	Offer regularly %	Offer occasionally %	Can provide on request %	Plan to introduce in the next 1 - 3 years %	Outside our offering %
Current trends, best practice and available options in research publication and dissemination methods and models nationally and internationally, including scholarly communication and open-access publishing	11	22	22	11	33
Skills to participate effectively in research projects	11	11	33	0	44
Project bid and report writing	22	11	22	0	44
Author rights, copyright legislation and IP issues, and plagiarism	22	11	22	0	44
Evaluation skills, e.g. of information and data sources, collaborative opportunities etc.	9	18	18	0	55
How researchers access and use information, within a discipline/subject and at different stages of the researcher's career	9	10	18	9	55
Mobile technologies, Web 2.0 and other researcher communication tools (e.g. Mendeley, Virtual Research Environments)	11	11	22	0	56
Sources of research funding	22	11	11	0	56
Marketing library services to researchers	22	22	0	0	56
Research impact factors and performance indicators, citation analysis, bibliometrics, etc.	11	0	33	0	56
A typical researcher's experience, including their workflow	18	0	18	0	64
Manipulation and presentation of researchers' information	18	0	18	0	64
Skills to build strong relationships with researchers other campus professionals and to establish collaborative partnerships externally, and to manage client relationships	27	0	9	0	64
Skills to gain an appreciation of individual researcher/project needs, including effective listening skills	18	0	18	0	64
Designing information literacy training (both face to face and online) to meet the identified needs of different types of researchers	11	11	11	0	67
Preservation of research outputs	11	0	22	0	67
National research assessment processes, and the requirements of the REF	11	0	22	0	67
Archives and special collections in different disciplines/subjects	0	9	9	9	73

	Offer regularly %	Offer occasionally %	Can provide on request %	Plan to introduce in the next 1 - 3 years %	Outside our offering %
Bibliographic and other finding tools in different disciplines/subjects	9	0	18	0	73
Data manipulation tools used in different disciplines/subjects	0	9	9	9	73
Data mining	0	9	9	9	73
Data sources in different disciplines/subjects	9	9	9	0	73
Services and opportunities provided by national and international collaborative initiatives and agencies such as UKRR, RIN, and RLUK	0	0	27	0	73
Tools and processes to manage researchers' information, including its portability	9	0	18	0	73
Creation of metadata schema	11	0	11	0	78
Discipline/subject specific metadata standards and practices	11	0	11	0	78
Use of metadata	11	0	11	0	78
Preservation of project records e.g. correspondence	0	0	22	0	78
Content (in various media) available to different disciplines/subjects	9	0	9	0	82
Data management and curation, including ingest, discovery, access, dissemination, preservation, and portability	0	0	18	0	82
Information discovery and literature searching	9	0	9	0	82
Synthesis and analysis skills to provide digests of 'discovered' information	9	0	9	0	82
Citation and referencing, and the use of bibliographic management software	0	0	11	0	89
Compliance with the various mandates of funders, including open access requirements	0	0	11	0	89

Table 5 The extent to which students opting for academic library options on postgraduate courses acquire knowledge/skills in the following areas

NB UK results in bold; all respondents in brackets

UK results in bold All respondents in brackets	Awareness %	Good understanding %	High level of expertise/ practical ability to do %	Not covered in the curriculum %	Plan to introduce in the next 1 -3 years %
Discipline/subject specific bibliographic and other finding tools	27 (18)	27 (18)	36 (59)	9 (6)	0
Knowledge of a typical researcher's experience, including their workflow, and how researchers access and use information, within a discipline/subject and at different stages of the researcher's career	18 (29)	55 (47)	9 (12)	9 (6)	9 (6)
Services and opportunities provided by national and international collaborative initiatives and agencies such as UKRR, RIN, and RLUK	64 (53)	27 (29)	0 (0)	0 (12)	9 (6)
Information discovery, literature searching etc.	0 (0)	18 (12)	82 (88)	0 (0)	0 (0)
Evaluation of information and data sources, collaborative initiatives etc.	0 (6)	55 (41)	45 (53)	0 (0)	0 (0)
Synthesis, analysis and provision of digests of, 'discovered' information	36 (24)	55 (47)	9 (29)	0 (0)	0 (0)
Tools and processes to manage researchers' information, including its portability	27 (29)	55 (53)	18 (12)	0 (6)	0 (0)
Manipulation and presentation of researchers' information	9 (24)	27 (35)	27 (18)	27 (18)	9 (6)
Discipline/subject specific data sources	45 (29)	36 (47)	9 (18)	9 (6)	0 (0)
Data management and curation, including ingest, discovery, access, dissemination, preservation, and portability	36 (24)	27 (35)	27 (29)	0 (0)	9 (12)
Data manipulation tools used in different discipline/subject	36 (24)	27 (41)	9 (18)	18 (12)	9 (6)
Data mining	55 (47)	27 (35)	0 (0)	18 (18)	0 (0)

UK results in bold All respondents in brackets	Awareness %	Good understanding %	High level of expertise/ practical ability to do %	Not covered in the curriculum %	Plan to introduce in the next 1 -3 years %
Design of information literacy training (both face to face and online) to meet the identified needs of different types of researchers	18 (12)	36 (35)	36 (47)	9 (6)	0 (0)
Current trends, best practice and available options in research publication and dissemination methods and models nationally and internationally, including scholarly communication and open-access publishing	27 (29)	27 (35)	27 (24)	18 (12)	0 (0)
Preservation of research outputs	55 (53)	36 (35)	9 (12)	0 (0)	0 (0)
Preservation of project records e.g. correspondence	9 (18)	36 (35)	9 (12)	45 (35)	0 (0)
Knowledge to support researchers in complying with the various mandates of funders, including open access requirements	55 (53)	9 (12)	0 (0)	36 (35)	0 (0)
Research impact factors and performance indicators, citation analysis, bibliometrics, etc.	36 (35)	27 (29)	0 (6)	27 (24)	9 (6)
Author rights, copyright legislation and IP issues, and plagiarism	0 (0)	64 (71)	36 (29)	0 (0)	0 (0)
Metadata	0 (0)	55 (59)	45 (41)	0 (0)	0 (0)
Creation of metadata schema	18 (12)	55 (59)	27 (29)	0 (0)	0 (0)
Discipline/subject specific metadata standards and practices,	45 (35)	55 (65)	0 (0)	0 (0)	0 (0)
Citation and referencing, and the use of bibliographic management software	9 (12)	36 (29)	55 (59)	0 (0)	0 (0)
Mobile technologies, Web 2.0 and other researcher communication tools (e.g. Mendeley, the Virtual Research Environment)	18 (12)	73 (65)	9 (24)	0 (0)	0 (0)
Skills to participate effectively in research projects	18 (24)	36 (41)	36 (29)	9 (6)	0 (0)
Project bid and report writing	36 (35)	27 (35)	9 (12)	27 (18)	0 (0)
Knowledge of sources of research funding	45 (47)	9 (12)	0 (0)	45 (41)	0 (0)
Marketing	18 (18)	36 (47)	36 (24)	9 (6)	0 (6)