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Developing a National Information Strategy in Scotland

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Abstract: *Developing and implementing a national information strategy has been of key interest to Scotland's political and LIS fraternity alike. This paper describes the components necessary to bring such a national information strategy to fruition and the role institutional repositories are to play in such a strategy. The use of institutional repositories – as a means of opening access to Scottish research output - supports a number of key political, social and economic factors intrinsic to the Scottish scene. Institutional repositories can underpin the work of HE institutions by providing a readable means of data management and promotion of research outputs. Yet, these benefits can only be reaped if librarians are placed at the epicentre of this vision; their unique skills and knowledge informing the implementation and ongoing management of globally interoperable repositories. The emergence of a distributed national repository infrastructure in Scotland is also explored, as is the overarching role intended for the new IRIScotland project.*

Keywords: information strategy, institutional repositories, librarianship, Open Access, Scotland

Introduction

Like Portugal, Scotland is a small country sitting on the western edge of Europe, with the wide open sweep of the Atlantic to the west and bordered by a much larger neighbour with which its history is intertwined. It has always relied on the inventiveness and ingenuity of its citizens and on a strong sense of community for its development. Other national characteristics have helped to forge a willingness to act independently. First, and perhaps most importantly, is a reverence for education and a meritocratic belief in the 'lad o' pairts' - the notion that those of talent from the humblest of origins can aspire to the highest of positions through an accessible education system. Secondly, the Scots' financial character is proverbially one of being mean, which Scots themselves would prefer to represent as being careful with money and shrewd in its investment. Scotland also has a small population with only some five million inhabitants, making it easy to get relevant groups together and to frame agendas based on common cultural values. That size also means that it is possible to develop national agendas in ways simply not possible for larger countries, reflecting Moore's (2000) classification of European countries. All of these factors in turn create a strong sense of community, social democracy, pragmatism and an anti-authoritarian view of the world (for example, see: http://gdl.cdlr.strath.ac.uk/redclyde/). The Open Access agenda therefore seems a natural one for Scotland to support.

Government Policy

The Scottish Government has a set of agendas based around developing Scotland as a hub of the global knowledge economy. This chimes well with the Open Access agenda and allows proponents of institutional repositories to argue for government investment in such repositories as a matter of national concern. Under the name *Smart, Successful Scotland* (Bow, 2004), a number of key priorities have been identified:

- Basic education and skills
- Research & Development and Innovation
- Entrepreneurial dynamism
- The electronic and physical infrastructure
- Managing public resources more effectively

Plans for the knowledge economy are based on the need for inward investment, for research, and for lifelong learning to create, recruit and retain a skilled workforce. All of these demand access to up-to-date research and information for sustainable competitive advantage. As the then Minister for Enterprise and LifeLong Learning declared, "'invented in Scotland' should also be 'made in Scotland'" (Alexander, 2001).

Other government concerns relate both to social justice and health, where again it is easy to make the case that the results of publicly funded research should be made available to the public who funded such research. The government wishes to maximise the benefits from research and economic investment. Finally, as in much of northern Europe, the native born population is in decline and government policy is then both to encourage the return of members of the Scottish diaspora and to encourage others to settle in Scotland (McConnell, 2004). The ability to present Scotland as a vibrant, wealthy, cultured and inventive country is seen as attractive to both these groups.

The commitment to developing the electronic and physical infrastructure of a so-called 'Digital Scotland' came initially from the First Minister, Donald Dewar (Dewar, 2000). At first this focused on ubiquitous internet access, even in remote rural areas, but it took little imagination to discover that institutional repositories were another element of a range of services and applications which also happily fit with infrastructure investment with the aim of delivering seamless access to a range of e-services

The Relevance of Open Access to Government Policy

Scottish government sees a range of potential benefits which coincide with the Open Access agenda.

Scots have always prided themselves on the distinctive nature of Scottish education in general and Scottish universities in particular. The government clearly understands the opportunities and benefits which flow from a strong research base in education and a strong involvement by the population. "Only if we become a learning nation can people, of all ages, confidently commit to Scotland as where they want to develop their talents and bring up their families. It means recognising Scottish universities as our savings bank for the future. Both the source of new ideas and the nourishment of our people" (Alexander, 2001).

Some combination of open access and institutional repositories helps meet the desire to showcase an impressive research capacity. With only 8% of the UK population, Scotland wins 12% of the UK research awards, while it ranks third in the world in research papers per head of population. As a result, government is well aware of the value of knowledge and access, and of institutional repositories as a vehicle for marketing Scottish research and of branding it as the output of the Scottish knowledge economy.

There are two final specific goals which government can see as being promoted by the development of repositories, albeit at a more peripheral level. Firstly there is a wish to achieve "Best Value"; to modernise through e-government and the broad use of e-service delivery. Repositories are both an exemplar of this, but also a mechanism for sharing practice based research outcomes. Secondly, Freedom of Access legislation has recently been enacted and the country is moving steadily towards a culture of access to information across a range of areas, especially in relation to public access to publicly funded research.

The Scottish Institutional Perspective

Whilst Open Access potentially expedites a large range of benefits that resonates squarely with what the Scottish Executive refer to as a 'Smart Successful Scotland', the impetus for Open Access comes from the potential for Scottish Higher Education (HE) institutions to derive particular benefits. Many of these benefits are generic and are quite typical of HE institutions around the globe; others are intrinsic

to Scottish institutions. However, the advantage that underpins the institutional repository concept for institutions is that they present - by virtue of facilitating the efficient re-purposing of information relating to personal and institutional academic output - an effective solution to a series of data management and performance measurement issues.

It is clear that institutional repositories can support universities by providing a readable means of generating, organising, disseminating, managing and retrieving information pertaining to the research outputs of academic staff and institutions. Governments and research funders around the globe increasingly wish to measure research quality and impact so as to determine where best to allocate future funding. One such manifestation of this measurement is the UK Research Assessment Exercise (RAE 2008, 2005) which, although the foremost target of research evaluation for Scottish HE institutions, actually tends to focus on the performance of specific academic groups or departments as the principal unit of assessment, employing a combination of peer review methods and quantitative analyses. As an assessment strategy, the Research Assessment Exercise (RAE) is frequently subject to fundamental objections from within the academic community and, as Day (2005) notes, is criticised as being biased, extremely costly, and harbouring a lack of transparency. A lack of bibliometric indicators and suitable statistical measurements are similarly identified as problems. Nevertheless, the RAE remains the yardstick against which all UK institutions are measured.

The role of institutional repositories has quickly been recognised by Scottish institutions as a tool which can be deployed potentially to expedite, not only improved scholarly communication and information management, but also improved results in the RAE. Institutional repositories can create a definitive inventory of the research output of an institution; every item with an appropriate metadata record and having a full text document attached to it. From a purely bureaucratic perspective, institutional repositories have the potential to make the RAE less onerous by dispensing with those superfluous or redundant university workflows that frequently witness academic staff submitting and/or re-submitting the same information on research outputs to several university administrative departments. More importantly, however, institutional repositories allow those conducting the RAE to work from an effective database of research publications or outputs, thus informing assessors of the 'track record' of academics and the research impact of the institution under assessment.

It also facilitates the re-purposeing of item metadata for submission purposes and permits the management and delivery of these publications to the RAE panel members for assessment, all of which goes some way to mitigating the administrative costs incurred by institutions and government as a consequence of undertaking the RAE. The ability to re-purpose this information not only supports Scottish HE institutions in the RAE, but also makes the creation of a 'Scottish Research Directory' – a one stop shop documenting Scottish research activity – an aspiration that will soon become a reality via the IRIScotland project (Institutional Repository Infrastructure for Scotland). Such a tool would also clearly provide a basic information source for academic staff appraisals and for the purposes of reviewing continuous personal development (CPD).

A major factor underpinning the RAE is a measurement of research impact. An academic department with a low research impact and a consequentially low RAE rating, for example, is unlikely to receive large funding from government (or indeed other funding agencies), in future since the funders will not expect a proportionate return on their initial investment. Institutional repositories 'level the playing field' for Scottish academics and HE institutions by optimising the visibility and accessibility of any piece of research. Clearly, as Hitchcock *et al* (2003) note, this does not promise that a piece of research will be cited more often or used more extensively, but at the very least it ensures that research is no longer 'lost' because potential users were unable to gain access to it.

More significantly, it has been argued that open access and self archived papers are more visible than papers published in subscription based services. Indeed, research conducted by a variety of scholars indicates that openly accessible papers are cited significantly more quickly and more widely (Lawrence, 2001; Antelman, 2004; Brody *et al*, 2004; Harnad & Brody, 2004). For particular disciplines (i.e. computing science), it has been calculated that openly accessible and self archived papers are cited as much as 286% more than 'toll only' papers (Lawrence, 2001), with others suggesting even greater figures for disciplines such as physics (Harnad & Brody, 2004; Brody et al, 2004). It is obvious that such a positive correlation between open access and increased citation will positively affect the research standing of Scottish HE institutions or departments located within citation based league tables and, by implication, assist Scottish HE institutions in achieving higher ratings at the next RAE. It is also noteworthy that institutional repositories are a useful tool upon which to construct other impact

measurements such as analytical citation techniques, usage statistics, or Webometrics, all of which could be used to support and legitimise the RAE peer review process.

Yet, institutional repositories need not be confined to providing access to self archived peer reviewed papers only – though this model is currently dominant and largely convenient to the Open Access movement in terms of securing community acceptance and 'kick starting' self-archiving. Institutional repositories, if given the room to develop and mature, provide a suitable vehicle for all types of research output, depending on the norms within particular disciplinary areas. Scholarly publishing has hitherto been extremely restricted in the forms of communication through which it chooses to disseminate. In this respect, institutional repositories are actually less about scholarly publishing than about scholarly communication. Recognising this communicatory role for institutional repositories facilitates the dissemination of a range of research outputs wider than the traditional academic publishing paradigm. Scholarly communication can therefore include a plethora of research outputs ranging from experimental data sets to a research project report, to a specifically designed research instrument; such a distinction is recognised by the Scottish National Information Strategy. In the future, it is also feasible to envisage institutional repositories contributing to the efficiency of Scottish HE institutions. By capturing routine operational documentation, such as departmental meeting minutes, campus wide memoranda, professorial reports, and so forth, institutions can minimise the time spent on the administrative activity which inevitably co-exists with research...

Perhaps more intriguingly, however, institutional repositories create a virtual space where disciplinary boundaries blur and researchers can coalesce at the very edges of their field of study. This too, in essence, constitutes an extension of scholarly communication. Institutional repositories accelerate the rate of scholarly communication and move researchers beyond their historically pre-defined areas of study, affording opportunities to discover one another, to share ideas, research or data, or even provide opportunities to pool intellectual capital. Opportunities like these would rarely have occurred in the past. Institutional repositories have increased the opportunities and the potential, and it is theorised that the research culture fostered in Scottish HE institutions will as a consequence be reinvigorated, further demonstrating Scotland's impressive research capacity.

Libraries: central to the strategy

Clearly, repositories can bring a great many benefits at an institutional level and also have the potential to redefine the mechanisms for, and scope of, scholarly communication. Such benefits and advances, however, will only be brought to fruition through the implementation of sound management and maintenance procedures. Contrary to the belief that web-based services, and search engines in particular, pose a threat to libraries (Iannello, 2005) and are diminishing the role of the traditional librarian, online repositories will fail to shift the boundaries of scholarly communication in the absence of core librarianship skills. Indeed, Morrison (2004) points out that "librarians have led the way in identifying the crisis in scholarly communication and developing potential solutions". Librarians are all too aware of the pressures academics face to publish in the few select top-ranked journals in their field, the frequent time lags between submission and publication of research work, and the costly subscription models for scientific journals. It follows that librarians have a sound understanding of the limitations of traditional models of scholarly communication and are well placed to contribute to the establishment and advancement of institutional repositories in line with the Open Access movement. The necessity of library involvement appears widely accepted since a content analysis of institutional repository literature conducted by the University of Tennessee (Allard et al, 2005) found that two-thirds of 30 articles identified, mentioned the involvement of libraries and librarians in the implementation of institutional repositories. In fact, the entire ethos of the library profession, to provide access, manage, organise and preserve information is both advanced and enhanced by the promotion of digital repositories.

The librarian's role begins prior to the creation of a repository at the point where a number of strategic decisions must be made. For example, what type of materials should be deposited?; who should be responsible for populating the repository?; who will complete and/or edit the metadata fields associated with each item being deposited?; how will quality control be exerted? The traditional librarian's expertise in collection development, cataloguing and classification is clearly essential here, albeit in a digital environment. It has become commonplace for librarians working in Scottish HE institutions to adapt traditional skills to new environments and applications as the pressure to keep abreast of new technologies in the digital age continues. Librarians are also under pressure to acquire a range of new skills in order to keep the profession 'alive'. Repositories are no exception. ‚An understanding of their

technical infrastructure is necessary. Indeed, in many cases, librarians may even be required to establish the underlying technical set-up of a repository (Daedalus, 2005). This demands an awareness and understanding of repository software, standards and interoperability issues.

Within an institutional setting the library has additional responsibilities to fulfil and challenges to meet concerning the success of repositories. As the link between the creators and the consumers of research output, the library is in a favourable position to implement training and to promote the use of repositories. If they are to self-archive, authors will require guidance on how to do so effectively in order to ensure materials are as widely accessible as possible, through the use of accurate metadata using appropriate standards. Likewise, users will require guidance on how to access the repository efficiently and effectively to retrieve materials relevant to their needs. Promotional activity is essential to encourage faculty members, researchers and end-users to view the repository as a valuable tool and librarians sound understanding of, and appreciation for, the value of information and freely available access to it, means that they are well versed to change the mindset of those opposed to open access.

Libraries are therefore key to the establishment and development of institutional repositories and have central roles in related activities such as training, promotion and advocacy. Perhaps more importantly, however, is the professional librarian's ability to establish quality control and conventions within the repository, thus greatly increasing its value. Each item deposited will have an associated metadata record. Librarians' strong understanding of the need for, and value of, metadata for effective information storage and retrieval means that they are likely to invest considerable time and effort creating high quality metadata and retaining consistency throughout the repository's records. Without this consistency, achieved through the implementation of conventions, authority files and an appropriate subject scheme, the value of a repository is severely undermined. Inconsistent entries for author's names, for example, may result in only a selection of that author's works being retrieved. It is crucial, therefore, that fields such as author name are completed identically for all of that author's material (even if the author has been inconsistent in his/her own publications). The use of a recognised subject scheme will bring an element of quality control and interoperability for those users searching by subject, a fact clearly recognised by librarians and information professionals. It is also advisable to adopt a controlled list of keywords. This helps to avoid users performing ineffective searches as they attempt to think of alternative terms and synonyms, which may not match those of the indexer. Terminology will vary among 'depositors and retrievers' due to wide variation in language; even the possible addition of UK/US spelling variations serves to undermine a repository's potential for resource discovery and hence access to quality research material. The quality and consistency of metadata also has implications for any future harvesting that may occur (Rajashekar, 2005).

One final responsibility where libraries may play a crucial role is in the generation of copyright awareness and compliance. The author community may not be confident in their understanding of copyright regulation and associated implications. This is indicated by the fact that institutional repositories are poorly populated even although around 92% of journals permit authors to self-archive (Harnad, 2005). It is crucial that librarians adopt a role in improving the volume of submissions to repositories in order to increase their use, perhaps partly through education on copyright and by highlighting the findings of project ROMEO (SHERPA, 2003). Where permission to self-archive exists, but authors are overlooking the opportunity to deposit, the proliferation of open access is not only being impeded, but also the shift to a more rapid and widespread model of scholarly communication.

Moving beyond individual libraries and librarianship skills, the importance of open access and the value of digital repositories has been recognised by the wider library-related organisations in Scotland. SCURL (Scottish Confederation of University and Research Libraries) fully supports the Open Access movement having set up OATS (Open Access Team for Scotland). The Team coordinated the 'Scottish Declaration on Open Access', (similar to that undertaken in Berlin in 2003 (Max-Planck-Gesellschaft, 2003) and the premise of the Bethesda Declaration on Open Access publishing and the Budapest Open Access Initiative (ibid.)), now signed by all 15 Scottish HE institutions. A corresponding event took place in October 2004, with attendees including senior representatives from Scottish Universities, research funders, SHEFC (Scottish Higher Education Funding Council) and the Scottish Executive. The Team proclaims that "the interests of Scotland will be best served by the rapid adoption of open access to scientific and research literature" (OATS, 2004). OATS views the move towards open access as strongly dependent on the growth of open access journals and an increase in self-archiving and, as such, has outlined a proactive way forward, bringing together many key parties across the country. The Team aims to advance the Open Access movement in Scotland by encouraging research funders and universities to mandate the deposition of research output in open access journals and repositories, by

recommending that SHEFC develop open access related policies in collaboration with Universities Scotland and by lobbying the Scottish Executive.

Similarly, the importance of open access is being embraced by SLIC (Scottish Library and information Council) which believes that "Open Access Repositories, with the right metadata, will create a quality resource to market Scottish Research" (Fulton, 2004). The Open Access movement supports many of SLIC's key policy areas such as social inclusion, universal access and Best Value. As such, a number of projects have recently been funded under SLIC's Innovation and Development programme, whose outcomes will contribute to the Open Access agenda in Scotland. For example, 'Ensuring Metadata Interoperability Best Practice', to be carried out by the Centre for Digital Library Research at Strathclyde University, aims to create guidelines for best practice in choosing and using metadata for the management of digital objects in the Scottish Information Environment. Whilst such projects are underway, SLIC will continue to promote and develop open access throughout Scotland by encouraging researchers to deposit their work in repositories and by "Lobby[ing] the Scottish Executive to offer its support and ensure that publicly funded research has to be published for the wider public good" (ibid).

The Growth of a Distributed National Repository Infrastructure

Under the guidance from organisations such as SCURL and SLIC, and in line with Scottish Executive policy, the beginnings of a national infrastructure of repositories has been developed through the efforts of a number of projects. Various initiatives have established repositories across a number of Scottish institutions, providing the framework for a distributed, yet nationally co-ordinated approach.

JISC FAIR Programme Projects in Scotland

In the UK, the Joint Information Systems Committee (JISC: http://www.jisc.ac.uk/) is a body that provides strategic guidance to the further and higher education sectors on the use of information and communications technology to support teaching, learning and research. A funding stream from JISC has enabled UK higher education institutions to investigate the potential of repositories for the management of institutional information assets. The FAIR (Focus on Access to Institutional Resources) programme has funded a number of projects to explore the issues surrounding the sharing, delivery, discovery and interoperability of digital resources within the education information environment. It is this programme which has enabled a number of Scottish institutions to set up repositories through exploratory project work. The technical infrastructure for a distributed yet national approach to open access development has been laid by four FAIR programme projects led by Scottish universities –

- HaIRST (Harvesting Institutional Resources in Scotland Testbed), led by the Centre for Digital Library Research at the University of Strathclyde,
- Daedalus, based at Glasgow University Library,
- Electronic Theses, at The Robert Gordon University,
- Theses Alive!, at the University of Edinburgh.

HaIRST (http://hairst.cdlr.strath.ac.uk/) is investigating the cultural, organisational and technical requirements of the deposit, disclosure and discovery of institutional resources. The project is a collaboration between Strathclyde, Napier and St. Andrews Universities, and eleven of Glasgow's further education colleges. HaIRST provides OAISIS (Open Archives Initiative Scotland Information Service: http://hairst.cdlr.strath.ac.uk/oaisis/), which offers guidance on the development of Open Access in Scotland.

Different institutional repository models are being explored by the Daedelus project (http://www.lib.gla.ac.uk/daedalus/) at the University of Glasgow. Linked projects at The Robert Gordon University (Electronic Theses: http://www2.rgu.ac.uk/library/e-theses.htm) and the University of Edinburgh (Theses Alive!: http://www.thesesalive.ac.uk/) have developed institutional repository-based models for the deposit, preservation and access management of electronic theses and dissertations.

The Next Stage of Development - IRIScotland

The next stage of open access development in Scotland will be spearheaded by a project due to begin in September 2005, entitled IRIScotland (Institutional Repository Infrastructure for Scotland). IRIScotland pulls together all those organisations across Scotland's education sectors who have an interest in the promotion of, and access to, the nation's research output, and will build on the groundwork of the FAIR programme projects described above. The Scottish Confederation of University and Research Libraries sponsor the project, which will be led by the University of Edinburgh. Project partners include seven research universities (Aberdeen, Abertay Dundee, Glasgow, St Andrews, Stirling and Strathclyde), a further education college (Glasgow Metropolitan College), three research institutes (Centre for Digital Library Research, The Scottish Crop Research Institute, The Scottish Universities Physics Alliance), The National Library of Scotland, SLIC and OCLC PICA.

The power of this collaboration lies in the breadth of its partners. IRIScotland will provide a national repository infrastructure that will be globally interoperable. A pilot repository for the collective hosting of the output of smaller institutions, potentially located at the National Library of Scotland, will be established along side a harvester-based Scotland-wide repository searching facility.

To maintain an internationally competitive research base, the Scottish Higher Education Funding Council is encouraging collaboration amongst Scottish universities through cross-institutional research programmes (MacLeod, 2004). One such grouping, the Scottish Universities Physics Alliance (http://www.supa.ac.uk/), will be directly involved in the project. IRIScotland will support the agenda of institutional collaboration, not only indirectly through its own collaborative approach to developing the higher education information environment, but also directly by implementing the functionality required to simulate subject repositories within its pilot service.

The technical functionality of repositories has been adequate for some time; however a culture of self-archiving does not yet exist within many research institutions. Advocates of Open Access such as Stevan Harnad acknowledge that the potential of institutional repositories will not be maximised until researchers are mandated to self-archive (Harnard, 2005). At the same time, there is clear evidence that researchers will self-archive once mandated to do so by their funding bodies or institutions (Swan, 2005). In light of this evidence, IRIScotland will encourage cultural change within institutions by working towards the development of institutional research publication policies. Mechanisms and workflows will be established in order to "hand-hold" researchers through the process of deposit. Advocacy will be essential. As a strong coalition IRIScotland will be in a strong position to lobby the Scottish Executive to mandate the open access publishing of publicly funded research.

Conclusion

In many ways the development of a national information strategy for Scotland has been the result of unique and fortunate circumstances. The tremendous support afforded to education in Scotland – in large measure, a product of the Scottish Enlightenment – continues in earnest, providing fertile ground upon which institutional repositories can thrive. The small population of Scotland has undoubtedly made it possible to get relevant organisations together and to arrive at a national agenda based on common cultural values; a feat that might prove difficult for larger countries. Of course, opening access in Scotland via institutional repositories resonates squarely with a number of crucial government agendas, particularly the desire to promote education, research, development, innovation, entrepreneurial dynamism and effective management of public monies. The Scottish predisposition towards clever financial investment has, by itself, made the case for institutional repositories in Scotland. Institutional repositories can underpin university work by providing a readable means of generating, organising, managing, disseminating and retrieving information pertaining to the research outputs of academic staff and institutions. They also constitute a valuable tool in the pursuit of greater international academic standing and in the pursuit of greater government funding via the RAE.

Yet, these benefits can only be reaped if sound management and maintenance procedures are practiced. Librarians therefore sit at the centre of this vision; their unique skills and knowledge informing the implementation and ongoing management of repositories, from monitoring the quality of metadata to ensuring long-term stewardship of materials. However, the implementation of institutional repositories as part of a national strategy, although seeking local benefits first and foremost, seeks to enrich the global society too. This entails the observance of international standards to optimise future interoperability, not only with our friends in Europe, but also with the wider global community. IRIScotland will ensure Scottish institutional repositories meet these global interoperability

requirements. In this respect, the national information strategy for Scotland will not only benefit the Scots, but will contribute to the entire world.

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