Institutional Repositories in Irish Third Level Institutions: Collaborating for Visibility, Reusability and Access[1]

Jerald Cavanagh

Limerick Institute of Technology, Moylish Park, Limerick, Republic of Ireland.
Email: Jerald.Cavanagh@lit.ie

Padraig Kirby

Limerick Institute of Technology, Moylish Park, Limerick, Republic of Ireland.
Email: Padraig.Kirby@lit.ie

Abstract: *This paper will describe the development of Institutional Repositories (IRs) in Irish third level institutions – starting with the development of stand-alone repositories in the mid 2000's and the move later in that decade towards collaboration and resources sharing through the development of National Research Portals and also Learning Resource Portals. We will briefly look at the various institutional repositories in existence in Ireland and also National Portals such as RIAN which are helping to make Irish research more visible and accessible. Some important European Union initiatives will also be dealt with and finally we will look briefly at the NDLR – Ireland's National Digital Learning Repository.*
Keywords: *Institutional repositories; research; collaboration.*

Introduction

At the most basic and fundamental level, an institutional repository is a recognition that the intellectual life and scholarship of our universities will increasingly be represented, documented, and shared in digital form, and that a primary responsibility of our universities is to exercise stewardship over these riches: both to make them available and to preserve them. An institutional repository is the means by which our universities will address this responsibility both to the members of their communities and to the public. It is a new channel for structuring the university's contribution to the broader world, and as such invites policy and cultural reassessment of this relationship (Lynch, 2003).

IRs have been in existence in libraries since the mid 2000s (Lawton, 2009). Emerging initially in the academic library sector in large institutions such as Massachusetts Institute of Technology and the University of California, over the last decade Irish institutions have been developing IRs as a means of preserving and promoting their research output across the globe. In the Irish context the National University of Ireland (NUI) Maynooth were pioneers in this field and have the distinction of being the first Irish university to host an institutional repository with their ePrints initiative launched in 2003. In 2006 TARA (Trinity Access to Research Archive) was launched and this was followed by University College Dublin's Research Online in 2007. In 2010 all Irish universities and some other third level institutions such as Institutes of Technology had institutional repositories. However in recent years the focus has shifted more towards collaboration, pooling and sharing of resources. While up to recently Irish universities were maintaining IRs independently, important developments have been the IReL-Open project - an Irish Universities Association (IUA) initiative which is building online open access institutional repositories in all seven Irish universities and linking these together through a National Research Portal. A very significant result of this project is the RIAN National Research Portal which went live in June 2010 and is available at http://www.rian.ie/. For the first time, Irish research will be made freely available on a worldwide scale. The development of IRs has

not just focused on research. The development of IRs for collaboration and a community for sharing digital teaching and learning resources has seen widespread collaboration amongst third level institutions for the creation of Ireland's National Digital Learning Repository (NDLR) enabling sharing, collaboration and the development of learning resources (NDLR, 2010).

We will now describe the development of IRs in Irish universities – starting with the development of stand-alone repositories in the mid to late 2000s and the move towards collaboration and resource sharing through National Portals developed through initiatives like IReL-Open. We will also briefly look at some European Union initiatives which are helping to make Irish research more visible, and finally we will look at the NDLR – Ireland's National Digital Learning Repository.

A Review of Irish Institutional Repositories

As noted by Brennan (2007), Open Access Repositories are being constructed against the backdrop of heightened competition within the international research community and increased investment in research by governments, funding councils and the European Commission. Through initiatives such as the Programme for Research in Third-Level Institutions (PRTLI), the Strategy for Science, Technology and Innovation (SSTI) 2006-2013 and other forward looking initiatives there has been an enormous boost to funding across various disciplines such as arts, humanities and social sciences. Increased investment and competition leads to growing demands for accountability and evaluation of publicly funded research, and the failure of any Irish University to feature in the 'Top 100' of the 2005 Shanghai Jiao Tong University's Academic Ranking of World Universities caused us to raise "concerns about the quality of our universities and how we might deliver on our aspirations" (Browne, 2005 cited in Brennan, 2007). However some commentators have highlighted flaws in the Shanghai Ranking noting that it "credits a university with citations to publications which were written when an author was employed and supported by a rival university" (Brennan, 2007).

All Irish Universities and some Institutes of Technology in Ireland have IRs. Different content strategies have been adopted in developing their IRs. Several include depth and content while others emphasise breadth and IR size. We will now briefly examine these IRs:

ARAN (Access to Research at National University of Ireland, Galway http://aran.library.nuigalway.ie/xmlui/) is NUI Galway's institutional repository. ARAN collects, preserves and makes freely available scholarly communications, including peer-reviewed articles, working papers and conference papers created by NUI Galway researchers. Where material has already been published it is made available subject to the open-access policies of the original publishers. Like many other universities it promotes Open Access through Google, promotes the role of Open Access generally as well as initiatives such as Sherpa Juliet for funding. It advocates Sherpa Romeo for publishing and journal policies, stresses a commitment to the long term preservation and archiving of material deposited in the system and provides download statistics. It uses DSPACE, is multidisciplinary and users are encouraged to deposit journal articles, book chapters, working papers as well as conference papers. Material in ARAN is stored in collections based on the organisational structure of the University. At the highest level, collections in ARAN are divided up by College. ARAN then follows the organisational hierarchy of the University down to discipline. Within each discipline items are arranged by type, for example 'scholarly articles', 'conference papers' or 'working papers'. There are also collections for research institutes and centres. It is also possible to map an item from one collection to another, so a single item can appear in more than one collection if a member of staff has multiple affiliations. ARAN is one of the smaller IRs and up to 12-5-2009 ARAN had 62 items deposited (OPENDOAR, 2010).

Arrow@DIT http://arrow.dit.ie/ is the institutional repository of Dublin Institute of Technology which provides research output of the institution and up to 16-4-2010 Arrow had 1577 items on deposit. Content is chiefly articles, book chapters, conference papers, theses and reports with a useful browse function which allows publications to be sourced by Faculty/Department. All items in this collection are full text. This collection is being developed and is not currently a full listing. The term *publication* is used in the broadest sense as to encompass all forms of scholarly communication. It includes other useful features such as top 10 downloads, recent additions and a "paper of the day" alert. It uses digital commons software, users may register for RSS feeds to be alerted to new content,

and it encourages users to check the Sherpa Romeo database to find the publisher's policy with regard to self archiving.

CORA (Cork Open Research Archive) http://cora.ucc.ie/ is the institutional repository of University College Cork, Ireland. CORA provides access to scholarly research including peer-reviewed journal articles and electronic theses from across the four colleges and research institutes/centers. Users may set up RSS feeds to be alerted to new content. It uses DSPACE, is multidisciplinary, and is comprised of collections of peer-reviewed journal articles, research papers, book chapters, and other research materials as well as UCC research theses. Like ARAN this is still in development with just 24 deposited items up to 22-6-2009 (OPENDOAR, 2010).

DORAS (DCU Online Research Access Service) http://www.doras.dcu.ie is an online open access repository of research papers from Dublin City University and contains "a growing number of journal articles, conference papers, books, book chapters and theses from DCU authors" (Hill, 2008). Most of these papers are open access, and full-text papers are also indexed by search engines, thus making them easily searchable and retrievable using Google, Yahoo and Google Scholar. As noted by Hill (2008) nowadays "the only barrier that stands between an author and making his/her research open access is the time and effort required to upload the paper to the institutional repository". In the case of DORAS, DCU Library uploads the papers on behalf of the author – all the author has to do is email the file(s) to the Library, which will then check the paper for copyright clearance and upload the file(s) and bibliographic information associated with the paper. DORAS uses search engines effectively and in the first half of 2008, for example, 68% of traffic to the DORAS website came via search engines (Hill, 2008). It is structured in a web-friendly manner that makes it easy for search engines to crawl and index the web pages and full text files. Two-thirds of users accessing DORAS through search engines access it through Google, and Hill (2008) has emphasised the high visibility of DORAS papers on Google. In the academic year 2007/2008 DCU used DORAS for a one-year e-theses pilot with the Schools of Biotechnology and Electronic Engineering. Postgraduates submitting research masters or PhD theses were required to deposit an electronic version of their theses in DORAS. The pilot was successful and from autumn 2008 all research theses submitted for award in DCU must be submitted through DORAS. It uses EPRINTS software, is multidisciplinary and up to 4-2-2010 there were 1454 items on deposit (OPENDOAR, 2010).

NUI Maynooth Eprint Archive http://eprints.nuim.ie/. NUI Maynooth first launched ePrints in 2003 and was the first Irish university to host an institutional repository (Lawton, 2009)**.** It showcases the research output of NUI Maynooth and St. Patrick's College staff and postgraduate students. Its collection has grown steadily from 343 deposits reported in 2006 (NUI Maynooth, 2007) to 2025 up to 21-6-2010 (NUI Maynooth, 2010). ePrints has pre- and post-print research papers made available online by their authors. The papers may be journal articles, conference papers, book chapters, theses, technical reports or any other form of research output (Redmond Maloco, 2007). The resource has excellent statistical reporting capabilities providing anyone who accesses it monthly, daily and even hourly usage statistics, statistics by file type, country and even statistics for top ten keywords and key phrases. The resource has a specialized eTheses function and users can browse by author, department, subject, type or year with advanced and simple searching. NUI Maynooth's ePrints is run by the Library Service with assistance from the Computer Services Department.

*Research_online@ucd http://irserver.ucd.ie/dspace/***:** This is the repository for University College Dublin. Some items are not available as full text. Users can keep track of new additions to the collections by registering for email alerts and RSS feeds. It uses DSPACE software and provides free open access to scholarly research publications such as articles, conferences, theses, unpublished works in the Ecology and Environment, Computers and IT, Business and Economics subject areas. Up to 15-9-2010 Research Online had 1286 items on deposit (OPENDOAR, 2010). Research_Online provides statistics on the global, community, collection and item level.

TARA (Trinity's Access to Research Archive) http://www.tara.tcd.ie/. This site is a university repository providing access to the publication output of Trinity College, Dublin. Some items are not available via Open Access and are only available as metadata (bibliographic record) entries if publisher copyright restrictions apply (OPENDOAR, 2010). Registered users can set up email alerts to notify them of newly added relevant content. The site is well supported with background information and guidance documentation as well as a useful statistics function. TARA uses DSPACE and covers the Science General, Electrical and Electronic Engineering, Geography and Regional

Studies, History and Archaeology, Social Sciences General subject areas and has articles, theses, unpublished works as well as multimedia. As outlined by Brennan (2007) TARA is increasingly being used for preservation purposes to house older publications which have been digitized using high speed scanners by Eneclann, a TCD campus company specializing in high-quality digitisation. These older publications are individually catalogued to TCD library standards by a team of trained metadata inputers with quality control provided by professional cataloguers and subject specialists. This digital archive and its functionality must be seen within the broader context of the development of TARA, which was built with initial funding from TCD's Research Committee to archive and provide open and free access to the scholarly output of Trinity College Dublin, including peer-reviewed papers, electronic theses, and grey literature, and to investigate the archiving of images as primary research materials (Brennan, 2007). TARA has approximately 2512 items on deposit at present.

University of Limerick Institutional Repository: http://ulir.ul.ie/. This relatively new site provides access to the output of the University of Limerick, uses DSPACE and is multidisciplinary. Users may set up RSS feeds to be alerted to new content. Up to 16-4-2010 this repository had 245 items on deposit. It features published and unpublished works of faculty and researchers at the University of Limerick.

Waterford Institute of Technology Repository http://repository.wit.ie/. This is an academic repository for Waterford Institute of Technology (WIT), a third level college in the South of Ireland. It is powered by Eprints 3, free software developed by the University of Southampton. Recent additions can be tracked in Atom or RSS. Not all items are available as open access materials, and some can only be viewed by registered users. The repository has 565 items on deposit (WIT, 2010). This institution has been keen to promote the value of data on repositories and its enrichment by social data through initiatives like OpenID (single sign-on solution to enable a user to authenticate once and gain access to the resources of multiple software systems) and Connotea (a social bookmarking service for academic publications) and their role in the prevention of the information overload that can be a downside of Open Access. (Mulvany & Kane, 2008). They argue that one way of overcoming this overload is to increase the ways in which people may evaluate information by using social data to evaluate existing metadata about an item. As outlined below, social data is about the collection of information about users' preferences that, in aggregate, can be used to provide reliable predictions about what an individual might be interested in.

> For example, in LibraryThing. . . when a user visits a page for a 'work' he or she is instantly able to see what (other) users who bookmarked this work also bookmarked. These items are also likely to be of interest to the visitor who is interested in a specific work. This is because these suggested items represent an aggregation of bookmark data generated by users who all have an interest in this particular item (book). The situation is similar for tagging with uncontrolled keywords/phrases. Users who click on 'fishing' for example are presented with a list of books for which 'fishing' is a prominent tag. (Mulvany & Kane, 2008)

With OpenID the user logs in to a website by authenticating against a 3rd party server and as OPENID is an open standard it can be implemented by anyone. Essentially what WIT are promoting through Connotea and OpenID is the realisation that a scholarly communications system that adopts the features that distinguish many of these social web applications will be far more compelling and useful than a passive search portal and that the adding of a 'social dimension to scholarly communication will have a synergistic effect, increasing the ease with which relevant materials can be sought and discovered by researchers (Mulvany & Kane, 2008).

National and European Initiatives

The benefits of institutional repositories are obvious to institutions. They support research and are a 'shop window' for publications and vital for individual authors as they provide increased impact and as Brennan (2007) has noted, academic and research staff are often measured on their personal research impact, which again is based on citations. This has led Irish libraries to develop a network of federated institutional repositories for Ireland. The Irish Universities Association Librarians' Group has come together under an IUA project to construct this national repository using funding granted from the Strategic Innovation Fund (SIF) of Ireland's Higher Education Authority (HEA). The 3-year project began in 2006 with the aim of making all Irish research output freely and openly available on

the web and of establishing IRs in all Irish universities and to create a national portal that will harvest papers from the IR. The national portal went live in June 2010 and is known as RIAN and accessible at http://www.rian.ie/. RIAN (the Irish word for 'path') houses publications from all of the aforementioned Irish Universities but does not include the institutional repository of Waterford Institute of Technology. It breaks down publications by publication type, funder, institution, year, gives statistics on each publication type and has a sophisticated advanced search where users can tick up to 14 publication types and other boxes for peer reviewed and non peer reviewed content. The content of institutions can be searched simultaneously and RSS is also available.

The Irish Government has identified growth in research as critical to ensuring Ireland's future as a key player on the world stage and essential in underpinning Ireland's investment in its future as a knowledge economy. For individual researchers, studies have shown that as a result of depositing material in institutional repositories citations increase, thus further disseminating the results of research, enhancing the researcher's reputation, supporting future student interest and collaborative partnerships (IUA, 2010). At national level a network of institutional repositories increases the exposure of national research output and allows services, such as enhanced searching and statistics generation to be developed using economies of scale. Services such as RIAN will demonstrate the impact of research to potential funders, who recognise the value of wider research dissemination and the associated research data that supports the reports and conclusions in published research. As Dr. John Hegarty, President of Trinity College Dublin, stated:

> The development of an institutional repository to demonstrate our research activity and achievement is a central element of Trinity's research support infrastructure. ...The IReL-open national portal will also play a vital role in communicating the strength of Irish research to a global audience, in attracting the highest quality of research to Ireland and in enabling valuable links with industrial partners. (Irish Universities Association, 2010)

Irish third level institutions are also engaging with Europe on projects such as DART-Europe and DRIVER. DART-Europe is a European organization made up of approximately 120 institutions including some Irish institutions. DART-Europe has created a portal that harvests doctoral theses from IRs. This portal is available at http://www.dart-europe.eu and Hill (2008) reported that approximately 100,000 doctoral theses were harvested into the portal. This rapidly growing portal is not only raising the profile of Irish research in Europe but is also an invaluable resource that can be used by PhD students and researchers.

DRIVER is another European initiative which harvests papers from Irish IRs and is an FP7 funded project with the main objective of building "a virtual, European scale network of existing institutional repositories using technology that will manage the physically distributed repositories as one large scale virtual content source" (IRCSET, 2008 cited in Hill, 2008). Available at http://driver-community.eu it is a multi-phase effort whose vision and primary objective is to establish a cohesive, pan-European infrastructure of digital repositories, offering sophisticated functionality services to both researchers and the general public (DRIVER, 2010). It sets out to build an advanced infrastructure for the future knowledge of the European Research Area and users can search and browse Irish repositories such as DORAS, TARA and others and hence is another route through which researchers can access Irish research.

The NDLR is a national pilot repository system funded by the HEA providing a full ongoing repository service for teaching resources. A key impact of the online NDLR service is to support greater collaboration in developing and sharing of digital teaching resources and associated teaching experience across all subject disciplines and communities of academics and to promote good practice use and re-use of existing resources. By being empowered by the support of communities of academics, staff from different disciplines can share effort and expertise as they raise the bar collectively for how they support their students' learning, embed research in their teaching and potentially embrace partnerships with research and industry, both in Ireland and internationally.

All Irish Universities and Institutes of Technology are partners in the NDLR. A key feature of the NDLR is the nurturing of learning communities and academic communities of practice to encourage successful implementation of the repository. Inter-Institution academic groups work toward improving the subject-specific learning experience and developing online collaborative tools to aid academic communities such as wikis and blogs, video/audio conferencing services. New online collaboration can be suggested and where possible hosted by HEAnet, Ireland's National Education

and Research Network which provides high quality Internet services to Irish Universities, Institutes of Technology and the research and educational community, including all Irish primary and secondary schools. Recent NDLR developments have seen the development of Communities of Practice (CoP's) called 'Smart CoPs'. SMART CoPs are communities in different higher education level disciplines (subject areas), corresponding to the International Standard Classification of Education (ISCED) subject taxonomy, composed of staff interested in the use and application of digital resources and technology in the teaching of their subjects (NDLR, 2010). They are cross-institutional subject discipline related communities associated with locally funded institutional learning innovation projects (LIPS) and cross institutional collaborative projects (LINCs) funded under the auspices of an Oversight Committee. The objective of moving towards project based funding at the local and 'early' collaborative levels is to encourage and sustain the development, sharing and reuse of digital resources, techniques and practices across a range of subject discipline areas once the NDLR moves to become a national service. At present the NDLR has 295 registered users, 23 communities of practice and 3222 items on deposit and so arguably it still has some way to go if it is to have truly national impact and appeal.

NDLR also encourages its users to develop Reusable Learning Resources (RLRs) using such software as Articulate Studio − a set of e-learning software tools which can empower anyone to quickly and easily create engaging courses, presentations, quizzes, and surveys using multimedia content. However the NDLR is not only an online entity and is keen to engage with and encourage communities of practice through running workshops and information sessions around the country on such topics as developing RLRs and Communities of Practice.

Conclusion

It is clear from our review of Irish institutional repositories that collaboration and resources sharing is now a key factor for Irish institutions in making Irish research more visible. We have seen the journey institutional repositories have taken in Ireland from a point where each institution was developing its own repository in the mid 2000s to another more mature and essentially more favorable position where Irish research is now made available on a National Portal and where the collections of each institution can be browsed and searched simultaneously as well as being available through EU repositories. We have also taken a brief look at the NDLR and its use in making teaching resources available online and its role in encouraging academic communities of practice and the development of e learning content. In this new decade Irish universities and institutions must continue to collaborate and share resources and while universities are strongly represented on national portals such as RIAN, Institutes of Technology are not at present. Perhaps this is an area where the Irish Universities Association and the Institutes of Technology could work together to improve the visibility of Irish research. While the NDLR is a highly worthwhile project it is still in development and much promotion and marketing will be required to increase its impact and visibility. What is certain, however, is that with their commitment to collaboration and to the reusability and sharing of resources Irish third level institutions are on the right path.

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