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Project Summary

The University of Reading has a large number of important repositories of archival data and collections of useful information. This project sought to create a unified system that provides a single virtual interface for searching across all the repositories and collections, with the aim of making the data and information more readily available. Within this project we also endeavored to develop a social network for researchers within the University of Reading.

Introduction

The LinkSphere project sought to establish a unified system that provides a single virtual interface for searching across the various repositories' and collections, and to develop a social network for researchers within the University of Reading. The project proposal, and thus its goals, were established in 2008, and filled a perceived need at that time.

The search functionality was based on an existing peer to peer (P2P) technology, Tycho, providing a flexible approach to supporting search across many collections of data

According to the Pew Research Center's Internet & American Life Project, June 2011, "The number of those using social networking sites has nearly doubled since 2008 and the population of SNS users has gotten older". The August 2011 report indicates the continuing rapid rate of change:

"Two-thirds of adult internet users (65%) now say they use a social networking site like MySpace, Facebook or LinkedIn, up from 61% one year ago. That's more than double the percentage that reported social networking site usage in 2008 (29%). And for the first time in Pew Internet surveys it means that half of all adults (50%) use social networking sites. The pace with which new users have flocked to social networking sites has been staggering; when we first asked about social networking sites in February of 2005, just 8% of internet users – or 5% of all adults – said they used them." (available online at <http://pewinternet.org/Reports/2011/Social-Networking-Sites.aspx>)

Although this is based on the US population, it shows 59% of the adult population who use the internet already use social networking software. Our experience from the RedGloo study, which has now been running for 5 years, suggests that users tend to migrate towards the major social networks which have significant number of their peers as users. This allows them to benefit from the network effect, and suggests that institution specific services would have to provide compelling extra value to be able to attract these users.

The type of functionalities which may enable such a service to take and maintain a foothold are those related to job activities. There are legitimate concerns about privacy with respect to both personal information and intellectual property rights, which can be seen as being at odds with the more open, sharing, nature of social network use. For this reason, the LinkSphere social network was designed with a fine-grained permissions system, allowing people to choose exactly who could view the content they posted. However, it is apparent that the existence of freely shared posts appears to give some users the impression that there is no privacy available within the system. On the other hand, a completely closed system, with posts only shown to people who are logged in, has no sense of community to draw users in. In order to see any benefits, they must decide to log in to the system, which provides a slight barrier to participation. In a climate of institutional change and economic austerity, people are less inclined to invest time and effort (however small) in engaging with a new system, unless they can clearly see the benefits.

Another additional aspect to the LinkSphere research was incorporating our understanding of how users approach and appropriate memory institution repositories. Additionally, we wished to understand how social media technologies were being used by academics. Whilst the team at Reading were constructing the system, the usability team at UCL began investigating what we knew about use and users of social media systems attached to museums, use of online museum repositories in general, and academic use of social media. We conducted a detailed research project into academic's use of twitter, and worked with UCL's communication office in establishing requirements in the use of social media in a University setting. This approach gave us valuable research outputs whilst the development team were engaging with constructing the system at Reading, including collaborations with the British Museum, UCL's Grant Museum of Zoology, and UCL's communications office. The outputs from these studies are detailed below. We also organised various workshops, interviews, and surveys with Reading University staff as the system progressed, to feed back information into how the system should best be developed. The studies into the users of the system are appended, below.

Project Outputs and Outcomes

The original aims of the project were:

1. To create a unified system that provides a single virtual interface for searching across the various repositories' and collections, at the University of Reading.
2. To develop a social network for researchers within the University of Reading.

The project proposal was developed in late 2008. In retrospect it is easy to see that the project aims were well founded for 2008, but did not see the changing world that would be arrived at in 2011.

On the one hand the project can be judged a success in that we:

1. We created a search interface that allowed users to search across some of the repositories and collections at the University of Reading, including some of those that we initially identified and others identified during the project.
2. We developed a social network for researchers at the University of Reading, based on the requirements that the researchers themselves identified.
3. We undertook usability analysis regarding the use of social networking in University contexts, and the use and users of online databases of heritage content, which resulted in publishable research outcomes that have gathered much interest from the cultural heritage industry and the Digital Humanities community.

On the other hand the project may be considered less successful in that:

1. A diversity of socio-technical issues meant that it took much longer than expected to include some databases than others.
2. while we developed a social network it has not attracted a wide user base.

Output / Outcome Type <i>(e.g. report, publication, software, knowledge built)</i>	Brief Description and URLs (where applicable)
LinkSphere software Blog	http://www.linksphere.org/
Experimental SNS	http://www.reading.ac.uk/linksphere/
Search facility	http://www.reading.ac.uk/linksphere/reposearch
Workshop	Mark Baker organised The Influence and Impact of Web 2.0 on e-Research Infrastructure, Applications and Users Slides at http://www.nesc.ac.uk/action/esi/contribution.cfm?Title=968 Video at http://redress.lancs.ac.uk/Workshops/Presentations.html#W2ER
Lecture	Mark Baker gave a public lecture at the e-SI Edinburgh on 16th June 2009 about "How Web 2.0 Technologies and Innovations are Changing e-Research Activities", (slides at http://acet.rdg.ac.uk/%7Emab/Talks/e-SI-public-Lecture-09/)
Round Table	Hugo Mills participated in a round table discussion on the Arts, Humanities and the Semantic Web, at DRHA 2009 Abstract at: http://dho.ie/drha2009/programme/abstracts
Workshop	Mark Baker organised Workshop on Users, Usability and User-engagement Based on e-Research, and Web 2.0 http://www.nesc.ac.uk/esi/events/1053/
Presentation	At the above workshop Claire Ross presented Academics Twittering On Video at:

	http://www.nesc.ac.uk/action/esi/contribution.cfm?Title=1053
Presentation	At the above workshop Shirley Williams presented This is Me: Digital Identity and Reputation for Academics Slides at: http://www.nesc.ac.uk/action/esi/contribution.cfm?Title=1053
Workshop	Mark Baker organised The Influence and Impact of Web 2.0 on Various Applications http://www.nesc.ac.uk/esi/events/1078/
Presentation	At the Above workshop Shirley Williams presented: LinkSphere Linking Researchers to repositories, collections and to each other Slides at: http://www.nesc.ac.uk/action/esi/contribution.cfm?Title=1078
Presentation	At the above workshop Hugo Mills presented: LinkSphere: P2P Cross-database search Slides at: http://www.nesc.ac.uk/action/esi/contribution.cfm?Title=1078
Workshop	At the Plymouth eLearning conference <i>Pat Parslow, Karsten Lundqvist and Claire Ross presented</i> Beyond the sky's limits, is social networking in academia a chance to sample Heaven? Abstract at: http://www.aida.h-da.de/atlantids/downloads/pelc_conference_proceedings_2010.pdf
Conference Paper	C. Ross and M. Terras, (2011). Scholarly Information-Seeking Behaviour in the British Museum Online Collection". In J. Trant and D. Bearman (eds). Museums and the Web 2011: Proceedings. Toronto: Archives & Museum Informatics. Published March 31, 2011.
Conference Paper	Ross, C., Terras, M., Warwick, C., Welsh, A. (2010). Pointless Babble or Enabled Backchannel: Conference Use of Twitter by Digital Humanists. Digital Humanities 2010. (pp.214-217). London: Office for Humanities Communication.
Conference Paper	Terras, M., Warwick, C., Ross, C. (2010). "Bridging the gap between users and developers: user centred design of a Virtual Research Environment to support academic collaboration". Digital Resources in the Humanities 2010, Brunel University, September 2010.
Journal Article	Ross, C., Terras, M., Warwick, C., Welsh, A. (2011). Enabled Backchannel: Conference Twitter Use by Digital Humanists. Journal of Documentation 67(2)
Presentation	Warwick, C., Terras, M., Ross, C., Welsh, A. (2011). "Lunch Hour Lecture: Great 2 Meet U IRL Twitter and Digital Identity". UCL Lunch Hour Lecture Series. March 17th 2011.
Book Chapter	Terras, M., Warwick, C., and Ross, C. (2011). "Building Useful Virtual Research Environments: the Need for User Led Design". In Dale, P., Beard, J. and Holland, M. (eds). University Libraries and Digital Learning Environments. Ashgate. p. 151-167.
Book Chapter	Ross, C. Carnall, M., Hudson-Smith, A., Warwick, C.,

	Terras, M. and Gray, S. (Forthcoming) Enhancing Museum Narratives:Tales of Things and UCL's Grant Museum. In Farman, J. (Ed). Mobile Media Narratives, University of Minnesota Press.
Book Chapter	Ross, C., Terras, M., Motyckova, V. (forthcoming 2011). *Scholarly Information Seeking Behaviour in the British Museum Online Collection.* In Hughes, L. (Forthcoming 2011). Evaluating & Measuring the Value, Use and Impact of Digital Collections. Facet. In press.

Initial design of Social Network prototype

The initial prototype for the Social Networking strand of the project was designed and implemented before the start of the project, in recognition of the fact that it was important to have something working to elicit user feedback.

Several different platforms were evaluated, including elgg versions 0.9 and 1.6, Lovdbyless, Joomla, Ning (previously used for some special interest groups at Reading) and Drupal (although technically a Content Management System, rather than a social networking platform). Drupal was chosen as the basis for the social network, on the basis of the maturity of the code, and the large number of well supported modules already in existence which facilitate both social networking features and work-related tools. A list of the modules included in the original design is in the Appendices.

In order for a social network site to offer benefits to its users, it must either have sufficient numbers of users that they benefit from the network effect or it must provide services which individual users will find beneficial before they make links with others using the site. As a starting site will, by definition, initially have a low number of users and it is impractical to 'seed' the network with enough people to make it feel 'lived in' when a new user encounters it, it was decided to provide some tools which might be useful to researchers. These tools included a bibliography tool, a simple project management and issue logging system, and both blog and wiki functionality.

Data privacy was provided at a per-item level, with users able to set the viewing and editing permissions on a per-user, per-group or global level. This meant that from the outset, the user was in complete control of how visible a post they made would be.

User authentication was implemented using web authentication, using the Kerberos protocol to authenticate against the institutional servers' authentication mechanisms. This was chosen over an LDAP solution for ease of implementation, due to prior experience with LDAP at the institution, and because the Active Directory entries are not sufficiently well populated at Reading to provide any additional utility – that is, there was no way of accessing information about whether a user was staff or student, for instance. Alongside this, a separate login method was maintained so that people who were not associated with the University could also have user IDs on the system.

The site was 'adopted' by the institution whilst still in development. This had the advantage that it was located in the university's URL naming structure, at <http://www.reading.ac.uk/linksphere>, but this also meant that it was subject to the same security rules as the rest of the institution's web pages. These are focussed on a push-model, rather than allowing user contributed content, and are not readily compatible with maintaining or authoring content.

Workshops & soliciting user feedback

Throughout the project, user feedback was solicited using workshops, the issue management system built in to the LinkSphere social network site itself, and direct observation in usability tests. Whilst waiting on updates to the system, and engaging with members of Reading's academic team who were potential users of the system, the UCL team used any free research cycles to pursue related research in usability of museum repositories, and how academics use social media systems elsewhere, to feed back design issues into the project.

The workshops were designed to introduce the users to the system, and provide them with some tasks to complete in order to elicit feedback. The workshops covered both the social networking aspects and the cross database search solution.

Findings from the workshops were collated by the team at UCL and prioritised by the project team. Details regarding the workshops are appended below, for information.

The initial workshop asked Reading University staff about their needs and requirements for an institutional social networking system. Around 20 staff members gave their opinions about the potential for social media in a one day workshop that gathered requirements. (see Appendix 1).

We also circulated a usability survey to all the University of Reading staff in January and February 2010. The aim of the survey was to gather information from University of Reading staff about the use of social networks and Web 2.0 applications, in order to develop user requirements for development of the LinkSphere Social Network; to collect opinions about the implementation of an Institutional Social Networking system, to gain a current picture of this rapidly developing area within Higher Education institutions, using the University of Reading as a case study. The survey was circulated to every departmental administration, with the aim of it being cascaded down to the academic and research staff in every department. From this process, the survey received 74 responses. (See Appendix 2).

The LinkSphere project usability team then produced an online survey and undertook interviews with the key institutional repository managers at the University of Reading in January and February 2010. The aim was to gauge the development of the disparate repositories and collections, their current usability and their opinions on the LinkSphere project, and recommend actions based on the information gathered to incorporating their repositories in a centralized system. (See Appendix 3).

The team also undertook a workshop at the Plymouth ELearning Conference 2010, to engage participants in discussions about the similarities and differences, between using social networking in education and in research, and attempted to draw out the requirements the participants would have for such a system (see Appendix 4).

The team conducted a final survey looking at the lack of uptake of the system and why this was problematic (See Appendix 5).

The team conducted a series of naturalistic observations of 5 academic and research staff using the LinkSphere site to understand how it could be embedded into working practices (see Appendix 6).

To steer the development team, the findings of the above user analysis tests were refined into a prioritized list to create a definitive user requirement document for the development team to implement (see Appendix 7).

The usability team undertook some work for the British Museum in looking at how their online system was used, in order to understand needs of users looking at cultural and heritage content. This resulted in a useful study that was presented at Museums and the Web. In addition, the usability team undertook a brief research project to understand how academics use social media

in general (focussing on twitter) which was presented at Digital Humanities 2010 and published in the Journal of Documentation.

Cross-database search development

- based on existing P2P platform
- work to stabilise and enhance Tycho
- many problems with interfacing to database systems
- mostly undocumented systems
- some people didn't want their data publically searchable
- P2P nature of the overall search application caused firewall difficulties (all-to-all communications, so n^2 firewall holes needed)
- evaluation was through the workshops, with feedback from those informing subsequent iterations of the interface

One goal in the design of the search system was to ensure that it had a relatively low impact on each of the data stores it was querying. While some of these data stores (e.g. the CentAUR ePrints system; the archives for the Museum of English Rural Life) had search interfaces which were machine-readable, many had not, or had no externally-accessible search interface at all. Thus, the search system was designed from the outset to be distributed, with separate components running near (in network terms) to the data stores. Since most of the data stores were running in different administrative domains across the University, robustness of the search facility in the face of individual systems being down was essential. This led to the search functionality being based on an existing peer to peer (P2P) technology, Tycho, allowing any part of the system to break while leaving the remaining components still functional.

At the outset, we had intended to harvest and store metadata about the repositories -- in particular, where it was possible, to develop basic ontologies for each repository's area of specialisation and to use that information to assist users with their search. This would have allowed the system to widen the search with related terms; for example, searching for the individual named sub-periods within a time-period in historical archives. To this end, we enhanced Tycho to store additional metadata within its distributed data store (called the Tycho registry). Ultimately, though, it was felt during the project that this functionality for modifying searches would significantly degrade search quality by introducing too much variation into the results, and the idea was shelved.

What did you learn?

- Apparent lack of clarity with regard to intended use of the Social Network element of LinkSphere. From a social space for new joiners through to a collaborative space for sensitive research information, the concept of the purpose of the social network could have benefited from greater clarity. However, a major issue was the size of the potential user-base, which may not have been large enough to sustain a social network without significant community stewardship investments. Coupled with the evidence from the Pew reports (2011), showing a massive increase in social network use over the period of the project, it is likely that any developments of this nature would meet with strong external competition.
- LDAP – the institutional Active Directory is not populated with information to provide for distinction between staff and students. Support group recommended use of Kerberos web authentication, providing a simple means of allowing users to log in with their institutional credentials.
- Virtual machines can have trouble maintaining correct system time. The root cause for this is as yet undetermined. The system has synchronisation to its physical server's clock,

- but we implemented frequent synchronisations because drifting server time can cause the user authentication using Kerberos to fail.
- There is a big issue with differing views about correct level of privacy of system - from those involved in test groups who believe system should be closed, limited to academic staff (some saying 'permanent staff' only) to those who believe that a social network only has value if it has people using it.
 - Having requested changes ('huge number of issues') filtered and prioritised meaning that developer does not get to see more than 5 of them means inefficient working. There are issues which require action by central support teams, which can have a long lead time. Access to the complete list of requested changes allows the developer to fix lower priority issues while waiting for issue resolution, whereas having a very limited set of change requests means that progress can easily be blocked.
 - Neither users nor project team members appeared willing to use the issue logging module to report problems (except in a very small number of cases). This appears to be at odds with experience of other systems available to the public.
 - Risks of staff leaving are real, and probably not sufficiently well assessed in risk analysis. Unfortunately, there were a number of events that impacted on the staffing:
Most significantly, as JISC are aware, Professor Mark Baker was unwell and has been on indefinite sick leave as a result since late 2010, as a result of this the project was extended until the end of August 2011, with Professor Shirley Williams taking over as Project lead from April 2011.
Dr Melissa Terras also had a period of sick leave followed by maternity leave from which she did not return until after the end of the project.
Dr Claire Warwick was asked to take over the role of Head of Department.
Ms Claire Ross (UCL RA) left the project to take up a PhD studentship.
 - Mod_security is used by the university to protect its web assets. Given a reported security vulnerability in PDF files during the project, the mod_security rules under-went a higher than usual level of updates, and, it turns out, this can cause problems with a Drupal install undergoing database updates. The institutional procedures and systems are also not well suited to coping with user-contributed content, and changes prevented both reference to PDF (and other) files, and regular maintenance tasks.
This could be avoided by maintaining contact with people developing systems, checking user requirements before implementing filters and having rigorous procedures to prevent negative impacts of change.
 - Only two of the project team made regular use of the social networking site themselves. Even some of their use was inhibited by the choice of theme decided at a project meeting, which lacked the flexibility of the default. However, this was modified to provide proper variable width support.
 - Only small numbers of staff were prepared to be involved in evaluating and using the system. However, of those that did, it appears that the sentiment is that social networking is useful, but that people already have enough of a presence on 3rd party tools. They are happy to use social networking for work related activities, and feel that such sites are best used for a mix of social and work related activity. There is little strong feeling about whether the system should be open for students to view, but generally it was felt that research students should be a part of the social network, and the site was acceptably easy to use. It is notable that many of these findings, from the final survey at the end of the project period, are mainly in direct contradiction of the findings from usability studies, which were based on a similar number of users. Details of the figures are presented in the appendices.
 - Given the extremely broad spread of subject matter for the various databases on the search side of the project, it was never entirely clear from the outset who the users of a unified search system would be: those users with a specific interest would typically go directly to the repository they needed for their query. It is plausible, however, that the search system could have a benefit as a "marketing tool", placed on the University's website to show off the breadth of the University's data collections.

- Many research departments, particularly in the areas of the arts and humanities, are unaware of the issues of managing data holdings in the long-term. Systems are put together on an ad-hoc basis, or developed for specific projects, with little or no thought for the long-term sustainability of the repository. There are several reasons for this: it can be hard to secure funding; many people are simply unaware of the issues (leaving a server unpatched, unmaintained, and not backed up for years on end); those people who are aware of the issues have little impetus or resources to implement them.
 - Academic individuals were interested in social media tools that fostered collaboration and communication, that saved them time, and streamlined research processes. They were interested in finding things (people, publications, research, funding). There were concerns about control and levels of access, how sustainable the data was, who could access the social network (whether it was internal or external facing, and public or private), and whether it was management or peer group driven.
 - There were concrete issues identified in providing access to federated digital content of museum and heritage repositories. None of the repository managers could provide a definitive count of digital items. Concern was raised about open access to closed collections, particularly copyright. Many types of the materials collected in a repository are actually not for dissemination but rather for internal teaching, management, storage and preservation, this additionally brings issues about metadata and the process of developing a systematic and standardised vocabulary across all the different types of digital resources within the IR's. None of the repository managers had a clear concept of how LinkSphere would work and how it had a specific benefit to their repositories. In order to gain support from all of the repository managers involved in the LinkSphere project a regular and consistent contact time should be established.
 - Our Study and analysis of the use and information seeking behaviour of academics utilising the British Museum's Collection Online database has enhanced our understanding and awareness of the scholarly perceptions of their information environment. It presents the usability and functionality of the British Museum's digital collection as an important exemplar of how digital resources effect academic information searching and research processes. The research suggests that digital resources are used extensively by academics as part of their research process and are considered vital to their research. It became clear in this study that scholars are very aware of digital resources, particular those offered by cultural institutions, as there is a high level of expectation that museums with large collections, like the British Museum, will disseminate their Collection Online. Collections with a strong visual element are particularly useful: the Study shows that academics rely heavily on images, placing large emphasis on viewing the images to ensure they have found the correct object. However, a clear distinction between a physical visit to the British Museum and an online visit can also be discerned; academics believing that a physical visit is a leisure activity and the online visit is for research and informational value. It is particularly interesting that the integration of social media applications into the Collection Online received a negative response, given the contemporary focus on enhancing collections through the use of social media and community tagging. The users we surveyed showed a willingness to adopt new methods of content dissemination only where the content is audience focused and appropriate for the medium. Academics display specific information seeking behaviour and sophisticated search strategies. The majority are seeking a known object, and utilise discipline specific search terms, showing goal driven intent and a detailed prior knowledge of the museum (and academic) information environment. They have an understanding of their individual search skills and patterning. Our analysis of the information needs of humanities researchers through their use of the British Museum Collection Online gives us a better understanding of search patterns and information seeking behaviour of a specific user group, and provides a valuable guide for further development and refinement of museum online collections one that should impact upon the design, implementation and access to digital museum resources as a whole.
- Our paper on academic use of twitter was the first exhaustive study that we are aware of that concentrates on how microblogging technologies such as twitter are used by and can benefit scholars. This data set provides both a valuable insight into the prevalence of a

variety of Twitter practices within the constraints of a conference setting, and highlights the need for methodologies to be developed to analyse social media streams such as twitter feeds. The study has indicated that, given Twitter is becoming increasingly important for academic communities, new, dedicated methodologies for the analysis and understanding of Tweet based corpora are necessary. Routinely used textual analysis tools cannot be applied to corpora of tweets in a straightforward manner, due to the creative and fragmentary nature of language used within microblogging. In this paper, a method has been suggesting to categorize tweets using open coded analysis to facilitate understanding of tweet based corpora, which could be adopted elsewhere. We learnt that conference hashtagged Twitter activity does not constitute a single distributed conversation but, rather multiple monologues with a few intermittent, discontinuous, loosely joined dialogues between users. The digital backchannel constitutes a multidirectional complex space in which the users make notes, share resources, hold discussions and ask questions as well as establishing a clear individual online presence. The use of Twitter as a conference platform enables the community to expand communication and participation in events amongst its members.

Immediate Impact

The social network was largely unused - lessons learned while developing (especially relating to institutional procedures) *should* be shared with the institutional information technology support department (ITS), as they have a bearing on future development work.

The impact of institutional re-organisations should not be over-looked. Although we have not specifically surveyed staff about the impact of changes in funding models, the forthcoming impact of the REF changes, and local redundancy threats across the institution, there is anecdotal evidence that this may have impacted willingness to participate in the project.

Greater awareness of disparity between privacy models (and the apparent inhibitive effect of allowing authors to give open access should they choose on those who don't want to share)

Within the search part of the project, there were a number of data sets being used and maintained by non-technical users. As part of the initial investigation work to find out what data was being kept by each department, it became clear that in many cases the owners of the data were unaware of any form of good practice in digital data archival or preservation (e.g. regular backups, system maintenance and upgrades, long-term maintainability of custom software). In some cases, they were aware that there were issues surrounding the long-term preservation of their data, but they did not know what should or could be done.

As a result of discussing the issues of maintainability, we were able to effect change within several groups in the University, for example by migrating their existing ad-hoc server provisioning to centrally-managed virtual machines which could be added to the regular site-wide backup schedule and managed by the University's central IT support department. Additionally, half way through the project, the University started a collaboration on developing a cross-collection search facility with its current library system provider.

The research outputs, however, of the usability studies had interesting spin offs, including book chapters about user led design in VREs, and use and users of the British Museum Online Collection, and the Grant Museum of Zoology collection. The results from the survey undertaken with UCL communications have yet to be published, and the work with the Grant Museum is in a reporting phase. The work on users of twitter has been cited by other studies, and the paper presented at Museums and the Web was selected for publication in their proceedings.

Future Impact

The low user participation may have been mediated by having a community support role on the team, to encourage use and explore potential niche uses within different communities in the institution.

It is unlikely that the social network side of the project will have a large impact, except, perhaps, as a cautionary tale.

However, the methodologies used to look at use and usage of online repositories of cultural and heritage content, and social networking systems, have garnered specific interest and already impacted on further research into these areas. It is expected that others will adopt our methodologies in engaging users in the design process, and using robust feedback measures to look at usability and usefulness of social media and online provision of heritage content. A couple of studies have already done so.

Conclusions

1. General Conclusions

The project demonstrated that cross-database search is feasible, although it has also highlighted the need for improved advice on data curation. Given the broad spectrum of data content addressed by the search system, though, and the prior existence of accessible search facilities on the majority of the repositories, the likelihood of it being used for more than casual use seems small.

The social networking aspect of the project has shown that people who are keen to adopt social networking may already have reached a saturation point in terms of the numbers of systems they are prepared to invest time in using. Additionally, the very low uptake indicates that there are many who are not interested in using a social network as part of their work activities, to the extent that they also do not respond to requests to participate in surveys.

The timing of the project coincided with upheaval in the sector and specifically the local institution which can reasonably be seen as a contributory factor in low levels of interest.

2. Conclusions relevant to the wider community

The project demonstrated the importance of understanding users and usefulness of a system, and promoted methodologies into the study and understanding of users. There is interest in the sector in knowing how to evaluate use of systems, and potential user needs.

3. Conclusions relevant to JISC

Projects which have the PI acting as project manager are particularly vulnerable to problems if that member of staff becomes ill. This is especially true if the programme project manager becomes unavailable.

It appears that there are only a small proportion of people willing to participate in social networking in the workplace. Because social networks rely on having sufficient numbers of users, it is likely that a sector-wide system is much more likely to be successful than an institutional one.

Recommendations and Implications for the future

If at all possible, avoid development systems from being under the same security regime as the rest of the institution's web presence, especially if the existing system is not designed to permit user contributed content. Although the system may need to be integrated with the institutional sites eventually, attempting to develop and maintain a system when intermediate filters may be changed without warning is not recommended.

For institutions, implement an audit of research repositories and provide guidance on sound data governance practices. Institutions (libraries, possibly) should be prepared to offer services for storing and managing online data sets.

Projects should continue to liaise with potential users of the system. There is a great need to understand users of social networking and federated repositories, and little understanding of how to do so. There is potential for great research on constructing methodologies to approach this, in the changing information environment.

There should be more easily-accessible funding for data preservation, curation and access. There is typically very little provision in research project funding for making the project's research data available online after the termination of the project. Particularly for small projects in arts & humanities, where the amount of money for the project is limited, the money involved in maintaining the data set's availability online for any significant amount of time is large compared to the overall cost of the project.

If running a project based on social networking, make sure you have the resources necessary to be able to champion the site, seed it with users if possible, and to have community stewards in place throughout the project.

Separate the roles of project lead and project manager. Define deputies for the key roles, and establish procedures for handing over specific roles in the unfortunate circumstances of personnel becoming unable to fulfil their roles.

Ensure that the project staff are prepared to use the product themselves if at all possible, and that it is readily accessible both on and off campus.

Recognise the resourcing levels required for social networking projects.

References

Hampton, Keith N., Goulet, Lauren, Rainee, Lee, Kristen, Purcell (2011) "*Social networking sites and our lives*", Pew Internet, available online at

<http://pewinternet.org/~media/Files/Reports/2011/PIP%20-%20Social%20networking%20sites%20and%20our%20lives.pdf>

Madden, Mary, Zickuhr, Kathryn (2011) "*65% of online adults use social networking sites*", Pew internet, available online at <http://pewinternet.org/~media/Files/Reports/2011/PIP-SNS-Update-2011.pdf>

Drupal, <http://drupal.org/>

Kerberos Authentication Protocol <http://web.mit.edu/kerberos/>

Open LDAP, <http://www.openldap.org/>

Appendices

Appendix 1: Initial workshop (user requirements):

LinkSphere Workshop

Future User Requirements Post it Note session

- As a student I would like to search papers or other books in this system which can access to other database such as IEEE or school digital library so that I don't need to search other websites for the information
- As a PhD student I would like to make finding data/info easier so that I can work more efficiently.
- As a PhD student I would like to find useful research in my area so that I can further my knowledge
- As a researcher I would like to keep track of emerging 'hot' areas so that I can keep up to date with new trends/areas
- As a former student I would like to be able to keep abreast of developments in my field as they happen so that I can continue to learn and contribute after my course
- As a student I would like to be recommended with some valuable papers about my research field by the system so that I can learn efficiently without spending time searching
- As a potential research student (thinking of applying to Reading) I would like to get a feel for the work of my potential supervisors so that I can choose my place of work (Realise that this can't really work...)
- As a PhD supervisor I would like to be able to communicate easily with all supervisees and them with each other so that I and them can benefit from each other's expertise
- As a MA director I would like to make material available to my students (without copyright problems?!) so that I can make texts accessible to them
- As someone interested in many things I would like to be able to quickly see if something is relevant to save me time
- As an over worked academic I would like to only read posts of less than 300 words so I cannot be bothered with full length research papers
- As an administrator (as well as an academic) I would like to streamline admin so that I can use my time for teaching research
- As a busy lecturer would like to find a purpose for using LinkSphere that saves me time, rather than becoming an additional activity so that I can have a life (or get on with the teacher or research rather than 'talking' about it)
- As a general user I would like to be able to easily see who can view content I have added so that I can have confidence in the permissions system
- As a collaborator in EU projects I would like to have an environment I can invite them to so that I don't need to have yet another shared site
- As a user of social networking/bookmarking sites I would like a feature like the 'preview' function in facebook when posting a link so that I can make resources more appealing
- As a researcher in different disciplines I would like to know how to group tags together into useful clouds (childhood, toys, play etc) so that I can collate useful ideas

- As a blogger I would like to see interfaces that somehow stir things up – by questioning words used (asking for folksonomic definitions) and provoking users so that I can/we can have more interesting debates
- As a blogger I want to be able to link so not to duplicate
- As a developer of related systems I would like to publish content automatically so that people can comment on the output of my systems
- As a developer I would like to be able to add user requirements on the system so that I can keep track of them and implement them
- As a head of school I would like to monitor submissions by staff in my school so I can compliment colleagues on all the research activity they do
- As a project manager I would like to send messages to the members of a group so I can communicate easily and effectively
- As a team leader I would like to be able to add user details so that I can get technophobes involved
- As a colleague of cynical academics I would like to be able to sell this system to my colleagues so that I can facilitate networking
- As a member of the university's e-learning team I would like to be able to offer and support the best tools for the job so that I can enable academics in the best possible way
- As a web mistress I would like to be able to link-in my website so that I cannot duplicate material already on my own website.
- As a person seeking funding I would like to know other in my institution with experience with that funder so that I can benefit from their experience.
- As a PhD student I would like to have groups as virtual seminars so that I can have feedback from professors
- As a researcher of Beckett I would like to know who else is doing work on Beckett so I can make contact with them.
- As a researched in Comp Sc ii would like to find people in other research fields to collaborate with
- As a critical theorist I would like to be able to find other people who are interested in that so I can discuss things with them
- As a graduate I would like to have access to a resource that enables me to get in touch with postgrads across all institutions so I can pick the best post grad course
- As a researcher in a department with diverse research interests I would like to be able to contact potential collaborators within and beyond Reading to plan research proposals etc
- As a researcher I would like to know others who have interests overlapping with mine so that we can collaborate (and not compete for external funds)
- As a researcher I would like a forum to discuss new ideas with a select group of colleagues

Key Themes emerging

- Collaboration
- Communication
- Timesaving

- Streamlining
- Finding things (people, publications, research, funding)
- Control and levels of access
- Longevity – sustainable data
- External vs internal
- Public vs private
- Top down vs peer group

Appendix 2: User requirements online survey

LinkSphere Project Research Report: Social Media and Academics User Requirements Preliminary Findings

Claire Ross
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February 2010

Executive Summary

The importance of social media is rising up the strategic agenda for management and users at UK Universities. As institutional engagement with social media applications is increasing there is a need to gather evidence as to the effectiveness of use of social media and user perceptions to it. The LinkSphere project, a collaborative project between the University of Reading and University College London, which aims to develop a system that provides a virtual interface for cross repository searching across the wide range of the Universities collections and repositories; the project will also integrate a social network for researchers enabling collaboration and a virtual networking space for cross-disciplinary projects. The integration of user centric design and evaluation into the project from the beginning will aid the development of a comprehensive collaborative tool, built specifically for the users' requirements. There is also a clear need to determine whether social media enhances the effectiveness of teaching and research within our institutions, not only to enhance the design and implementation of the LinkSphere project but also to expand our knowledge about social media use in an the academic environment.

The LinkSphere project usability team produced an online survey circulated to all Reading staff in January 2010, within a personal and professional context, and recommend actions based on the information gathered.

Questions were asked ranging from use of web2.0 applications, online collaboration, positives and negatives of utilising web 2.0 in work/research and their opinions on the implementation of a Institutional social Networking system.

Analysis of the responses has produced a series of recommendations:

- ◆ Support potential users with how to use web2.0 applications/LinkSphere workshops to increase uptake, prove academic worth and create trust.
- ◆ Rename the system as LinkSphere Research Network or LinkSphere Collaborative Space
- ◆ Include wiki functionality to enable co author work collaboratively within LinkSphere.
- ◆ Investigate Ning and LinkedIn for functionality ideas to incorporate into LinkSphere
- ◆ Link to or embed University of Reading Library Catalogue and institutional VLE, as well institutional email.

Introduction Aims and Objectives

User centric design explicitly and actively includes users in the development process from a early stage. Focusing on user requirements will enable the LinkSphere project to become embedded and owned by the users, creating a comprehensive collaborative tool specifically designed to the requirements of the users.

An initial user requirements survey was required, the survey forms part of the gathering user experience phase; providing the project team with an understanding of LinkSphere's potential users, their motivations, environment and experience.

The LinkSphere project usability team survey was circulated to all the University of Reading staff in January and February 2010. The aim of the survey was:

- ◆ To gather information from University of Reading staff about the use of social networks and Web 2.0 applications, in order to develop user requirements for development of the LinkSphere Social Network.
- ◆ To collect opinions about the implementation of an Institutional Social Networking system.
- ◆ To gain a current picture of this rapidly developing area within Higher Education institutions, using the University of Reading as a case study.

The survey was circulated to every departmental administration, with the aim of it being cascaded down to the academic and research staff in every department. From this process, the survey received 74 responses. Although there is a slight bias in the respondents from the School of Systems Engineering, the respondents as a whole were quite diverse, including staff from agriculture, pharmacy, fine art and communications.

Methodology

An Online survey was designed to be answered anonymously, concentrating on gathering data specifically on University of Reading staff perspectives on their use of social media and web 2.0 application in both a work/research and social context. The survey was divided into 24 questions, comprised multiple choice open ended questions and free text comments, in order to gain insights into the individual's motivation for and use of social media applications, online collaboration, and the benefits and negatives of web 2.0 functionality, and whether they believe a specific University of Reading social networking site would be beneficial.

To date 74 responses have been collected.

Research Findings

Respondent profile

Currently there is limited knowledge within academia of who is using web2.0 and social media applications and for what purposes. From this survey it appears the typical respondent is between 30 &40 (fig 1), female (fig 2) and holds an academic related support role within the university (fig 3).

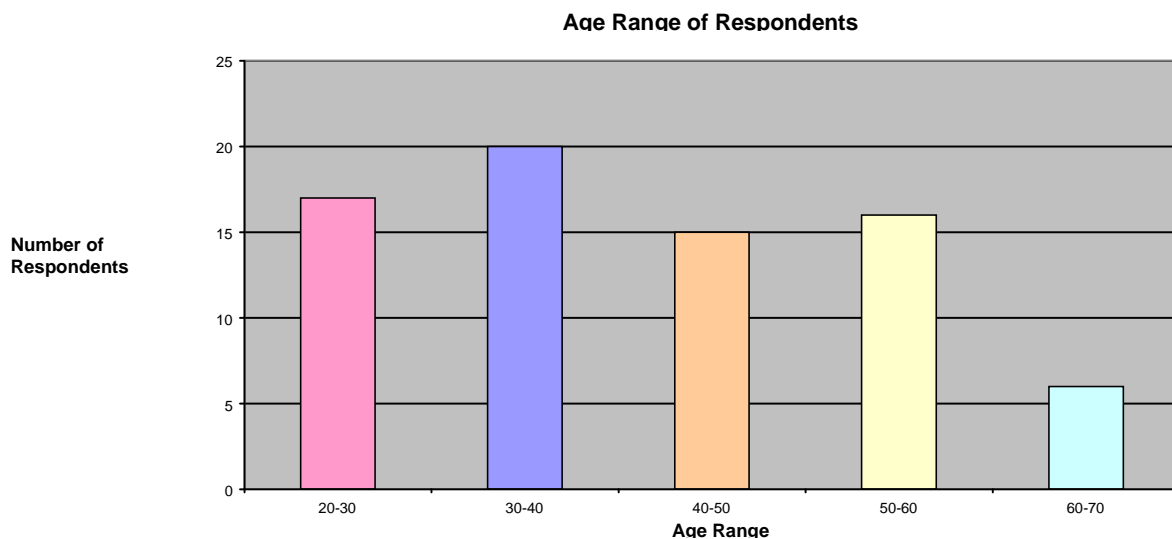


Fig 1: Graph showing the range of ages of the respondents

Document title: LinkSphere Final Report
Last updated : November 2011

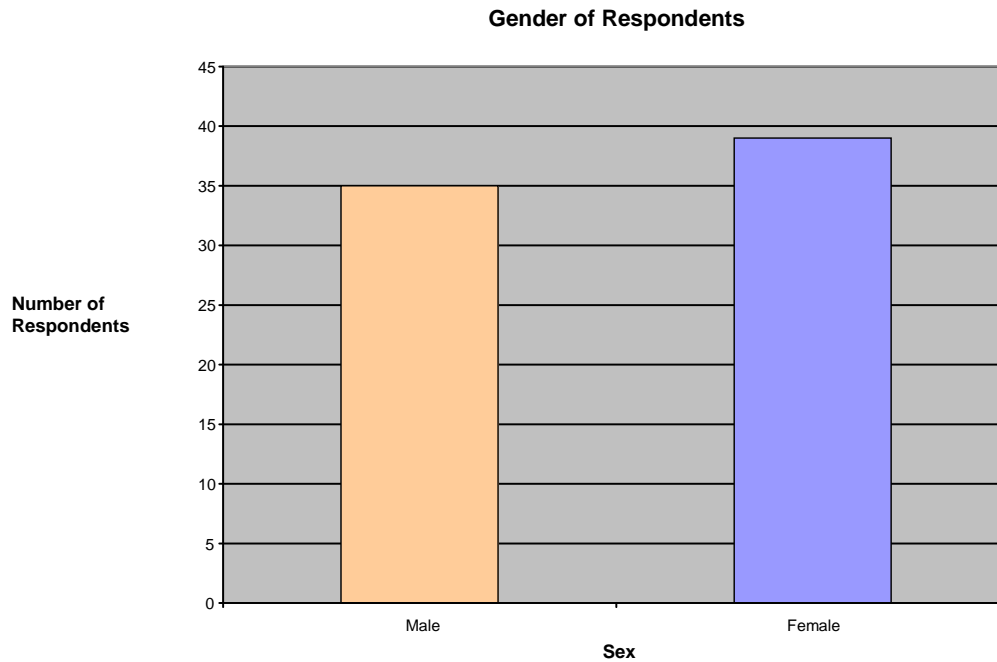


Fig 2: Graph showing gender of respondents, roughly equal

The majority of replies to the online survey were received from staff members who considered themselves to be Academic related support (fig 3), therefore this may have a bearing on the amount of use of web 2.0 applications used for research only purposes.

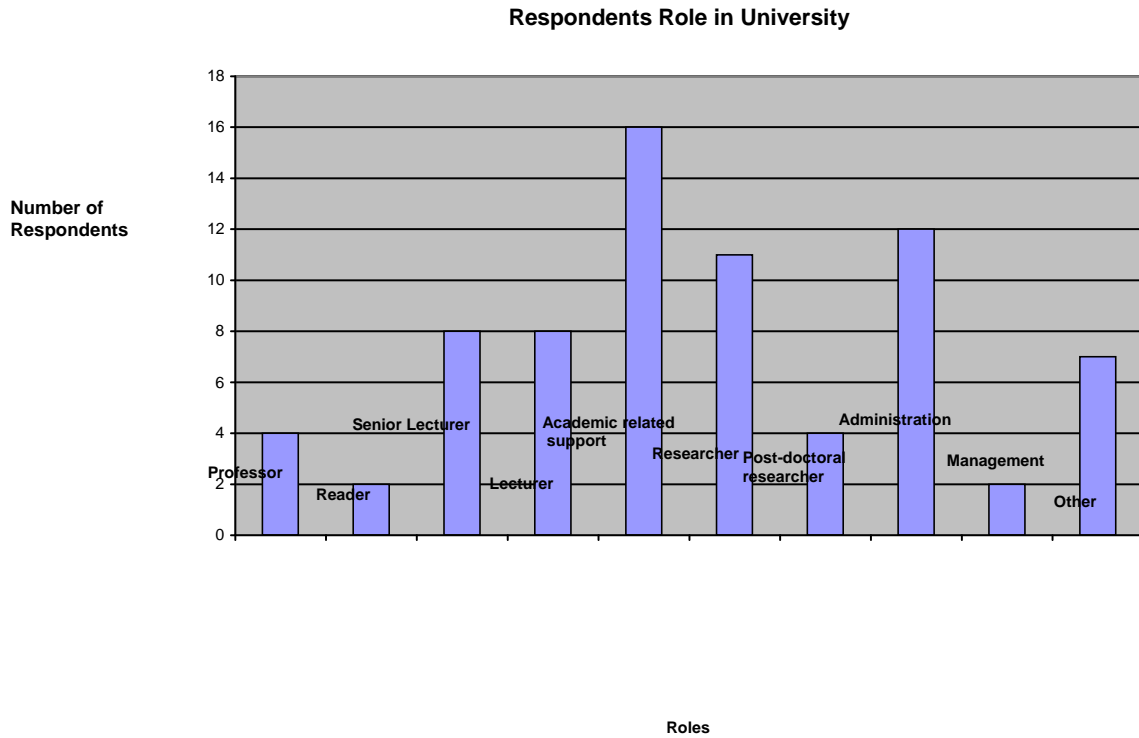


Fig 3: Graph showing respondents roles with the University of Reading

Responses were obtained from a wide selection of departments:

Department	Number of responses
Agriculture	5
Archaeology	1
Biological Sciences	2
CDoTL	2
Communications	4
DEAO	1
Digital Development	1
Economics	1
Engineering	1
Environmental Systems	2
Science Centre	
External Affairs	2
Facilities	1
Fine Art	1
Food and Nutrition	1
Geography	1

HBS Library	1
Informatics Research Centre	4
Information Management and Policy Services	1
Institute of Education	1
IT Services	3
Italian Studies	1
Meteorology	1
Pharmacy	6
Progress South Central	2
Real Estate and Planning	1
RES	1
RISIS	1
School of Management	3
Student Services Directorate	1
Systems Engineering	17

Fig 4: List of Departments who responded to the survey

Use of Web 2.0 applications

The following figures show the general levels of usage of a range of web 2.0 applications. The following categories could be selected by the respondents:

- ◆ Often for work/research
- ◆ Sometimes for work/research
- ◆ Often for social/leisure purposes
- ◆ Sometimes for social/leisure purposes
- ◆ Never use it
- ◆ Never heard of it
- ◆ Don't know

Several respondents selected more than one category, in some instances.

The main web 2.0 services used for work and research purposes are collaborative authoring tools (fig 5), predominately Wikis and Wikipedia (fig 8), compared to a very low usage of photo sharing (fig 9) for work and research. Social Networking is mostly used in a social context as too are video sharing and communication tools. When broken down into different types of tools, Wiki's are the main application used for work and research by the respondents, followed by Google Docs (fig 8). Video sharing via YouTube (fig 10) and Skype (fig 13) are also used in a work/research context. Suggesting that collaborative authoring, creating and sharing content and communication are important functions. Therefore it is worthwhile considering embedding the functionality of these applications or integrating the applications respondents already use into the LinkSphere SN. The overwhelming majority of respondents do not use any web 2.0 applications either for work or for social use. The passiveness of usage of already established social media applications may suggest that a social media enhanced virtual research environment may not be utilized to its full extent. Potentially systems of this type should not be too complex to use as the survey responses suggests less applications means increased functionality and usability.

Comparison between Web2.0 services used for work purposes and for Social purposes

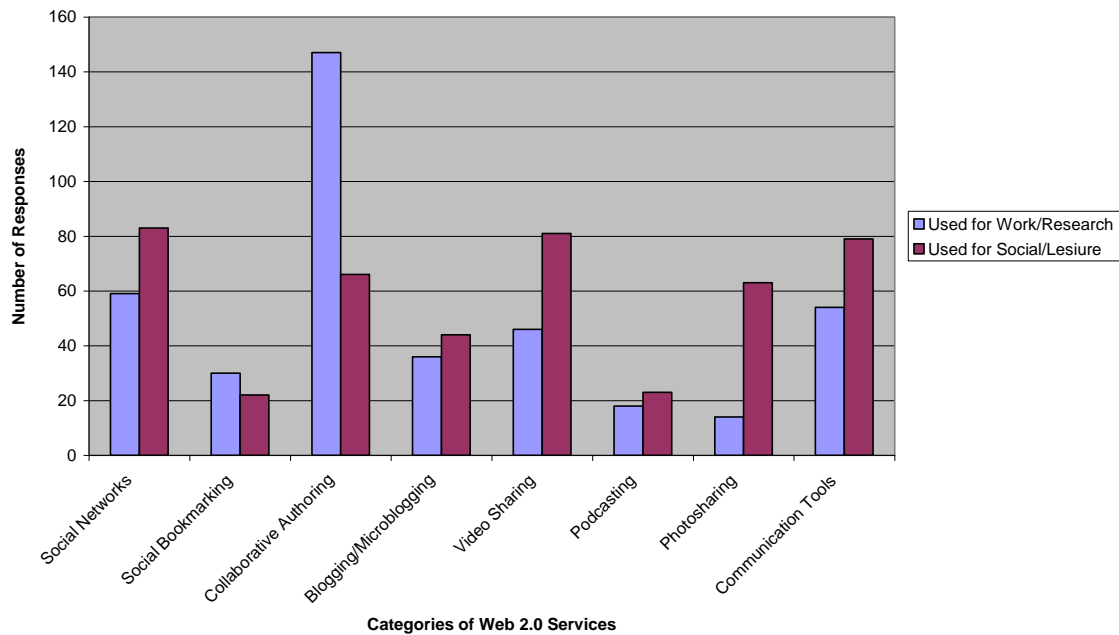


Fig 5: Graph showing the comparison between Web2.0 services used for work purposes and for Social purposes

Use of web2.0 services is growing exponentially yet within academia, active use of web2.0 is centred on the early adopters. University of Reading staff attitudes to social media and web 2.0 vary from enthusiasts to technophobes, it is important to consider the varied backgrounds, research interests and expectations. From the survey it is possible to suggest that the respondents who never use web2.0 applications are part of the late majority in an adoption curve. Therefore it is potentially unsurprising to find this passiveness of usage. Not all web 2.0 applications/services are used to the same extent as others; respondents utilised wiki's and other collaborative authoring tools more than any other web2.0 service in a work context. Within the categories of web2.0 and social media services there are clear market leaders: Wikipedia, you Tube, Facebook, Twitter. Flickr, iTunesU, MSN Messenger and Skype. Recommendation: to support LinkSphere uses with sessions and webinars about how to utilise the technology and provide case studies of their academic worth to increase uptake.

Respondent use of Social Networking Sites

The majority of respondents stated that they 'never use' social networking sites, particularly MySpace (52 responses in the never use category). Facebook, unsurprisingly is the most frequently used site in a social context, whereas, LinkedIn is the most used social networking site for work and research purposes by the respondents. From the free text comments Ning is a popular social networking platform

(6 responses). Recommendation: investigate Ning and LinkedIn social networking services for increased functionality ideas for LinkSphere.

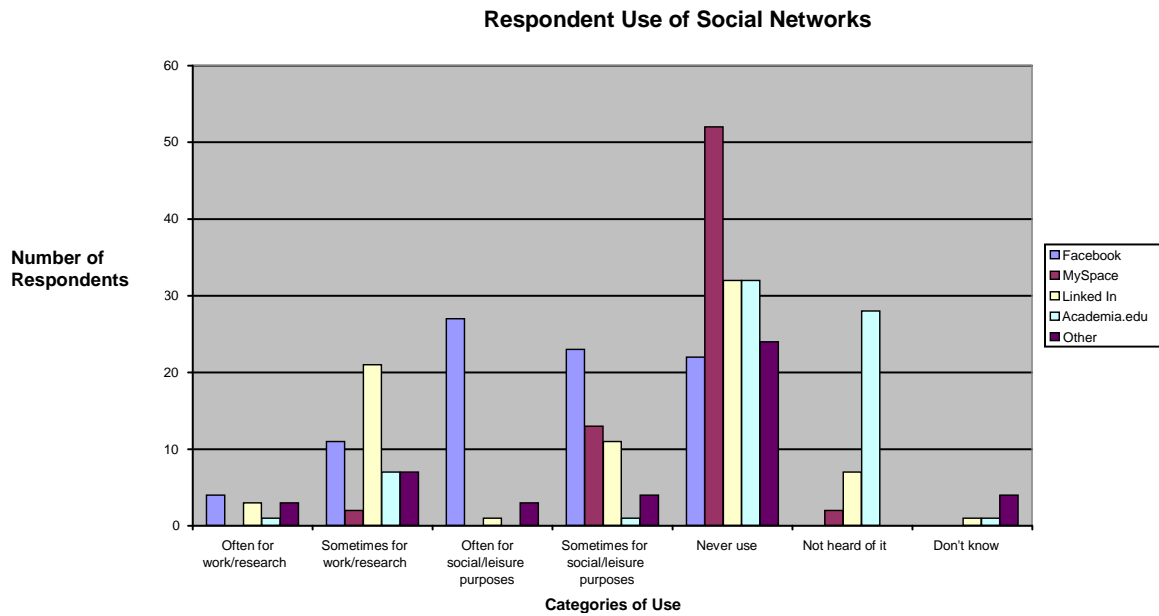


Fig 6: Graph showing Respondents use of Social Networking Applications.

Respondent use of Social Bookmarking Tools

The most common response to use of social bookmarking was 'never' regardless of the different applications named. This low usage suggests that social bookmarking is not a tool which University of Reading staff consider useful in either a work or social context. Recommendation: Provide specific support to LinkSphere users on how to use social bookmarking in an academic context.

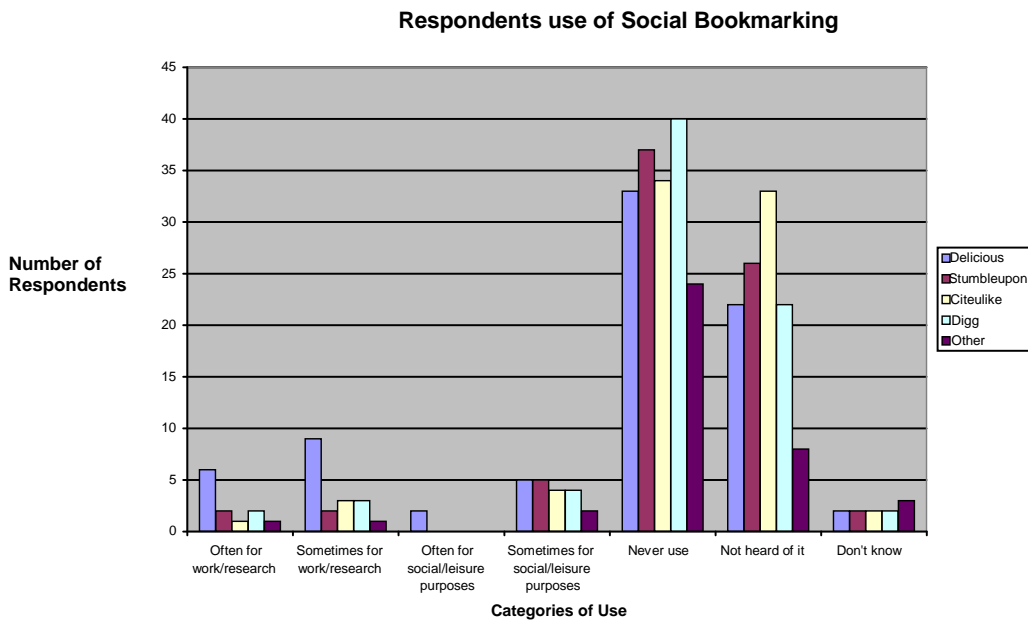


Fig 7: Graph showing Respondents use of Social Bookmarking Tools, the majority of respondents never use any social bookmarking applications.

Respondent use of Collaborative Authoring Tools

Wikipedia and wikis are the most used collaborative authoring tool, with wikipedia being cited as often used by the respondents for work/research (16 responses) and sometimes used for work/research (41 responses). This suggests that collaborative authoring, particularly the use of wikis, is important to the work and research practices of staff. Wikis have been utilised by academics for a number of years; implying that collaborative authoring services are more embedded into academic research practice than other web2.0 services. It is unsurprising that wikis are more commonly used for work and research by University of Reading staff.

Respondent use of Collaborative Authoring Tools

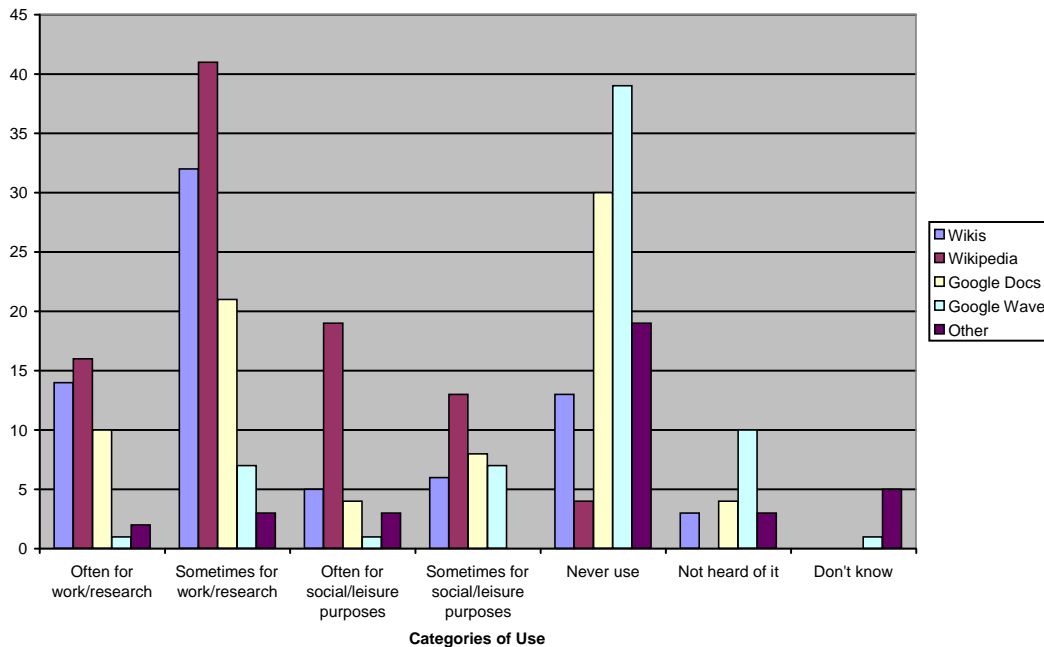


Fig 8: Graph showing Respondents use of Collaborative authoring Applications.

Respondent use of Blogging and Microblogging Tools

The majority of respondents never utilise blogging or microblogging technology, with only 5 respondents using blogs frequently for work and research, 7 respondents frequently use Twitter for work, whereas 12 use Twitter occasionally as a leisure pursuit. Recommendation: create guidelines for institutional use of common web 2.0 tools, particularly focusing on research blogging to encourage uptake.

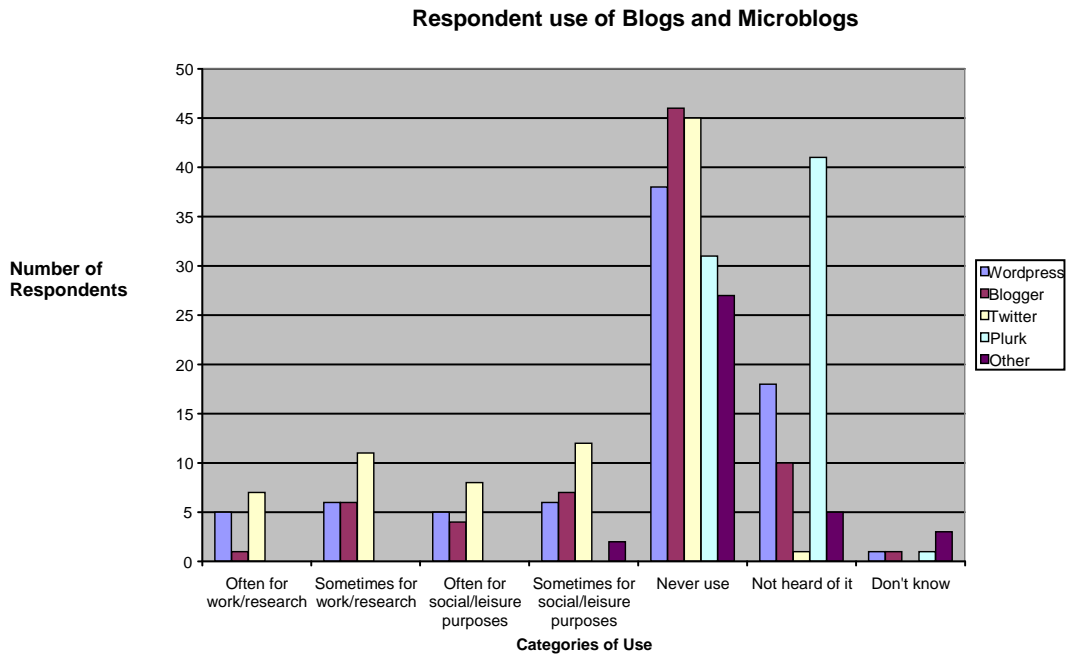


Fig 9: Graph showing Respondents use of Blogging and Microblogging Tools.

Respondent use of Video Sharing Tools

YouTube is the most used video sharing application both for social purposes (20 responses for often used, 34 responses for sometimes used) and for work and research (9 often, 21 sometimes). The remaining video sharing applications had not been heard of by the majority of respondents.

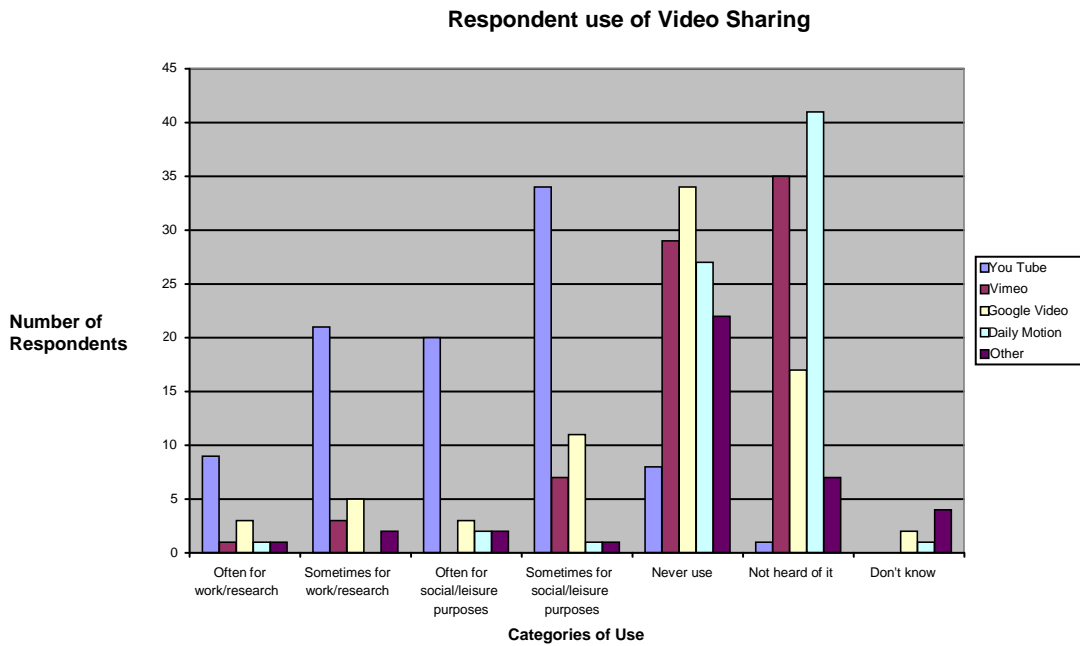


Fig 10: Graph showing Respondents use of Video Sharing applications. You Tube being the most popular application to use.

Respondent use of Podcasting Tools

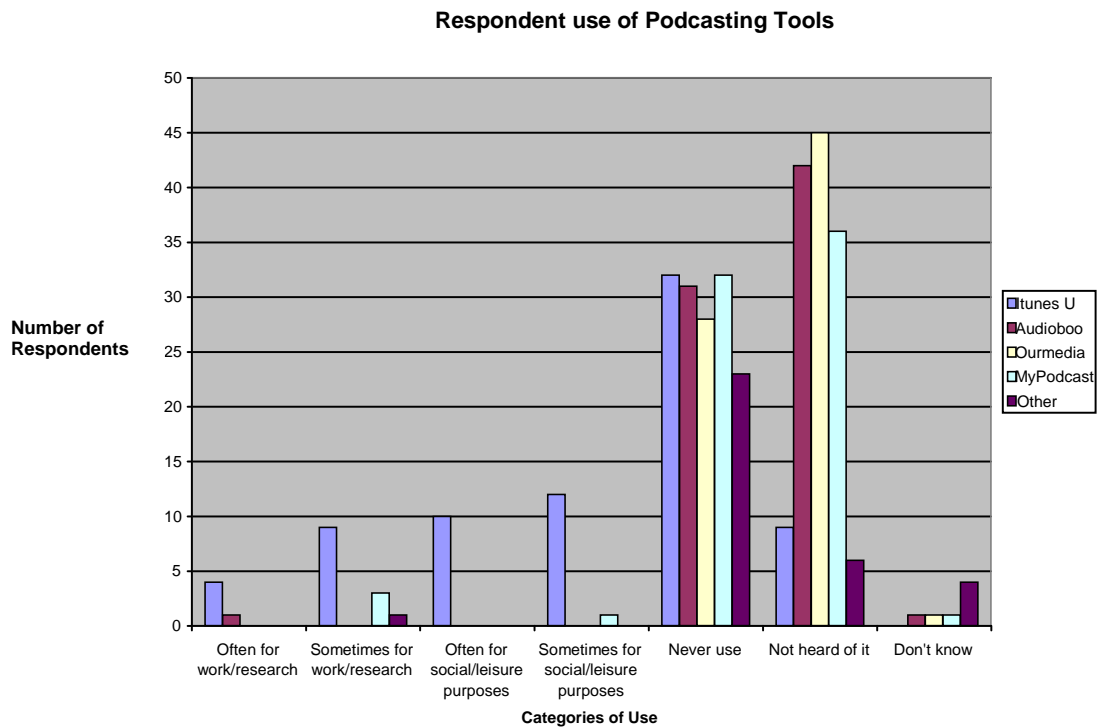


Fig 11: Graph showing Respondents use of Podcasting Applications

Podcasting services are not used by the majority of respondents. iTunesU is the clear market leader in terms of known podcasting applications, and is used for both work/research (13 responses) and social/leisure (22 responses) purposes.

Respondent use of Photosharing Tools

Photosharing is predominately a social activity, Flickr is the market leader. This suggests that sharing images is not common practice in research.

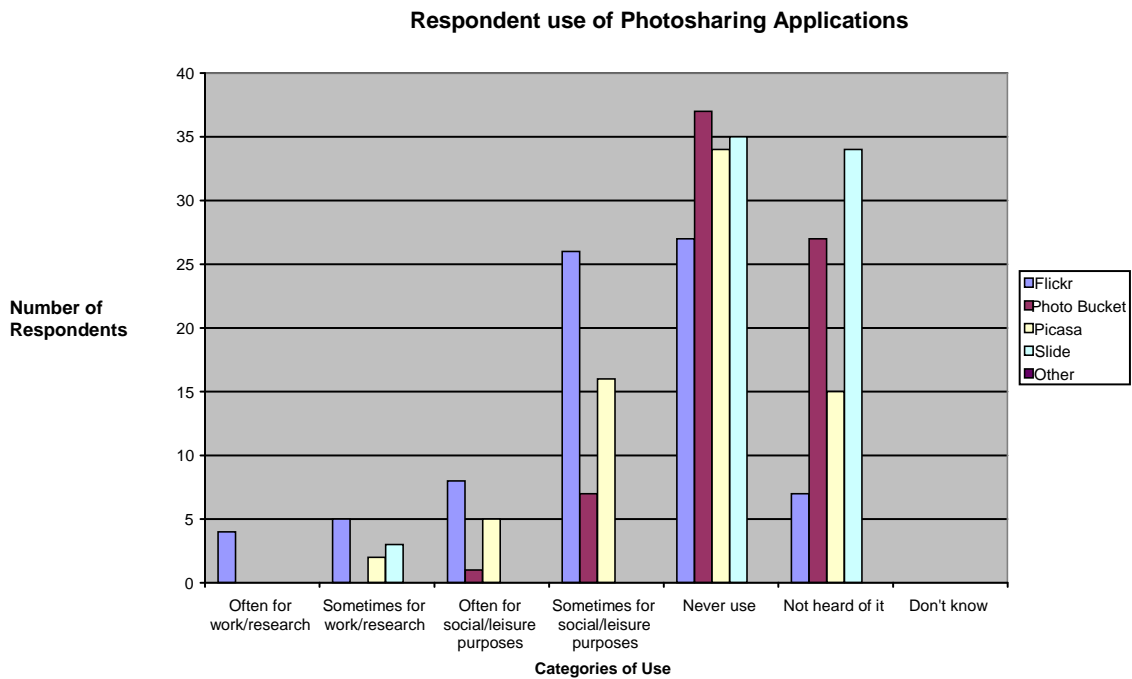


Fig 12: Graph showing Respondents use of Photoshaing Tools

Respondent use of Communication Tools

Collaboration between researchers/academic staff no longer limited to face to face meetings Skype is the predominate web 2.0 communication tool used by the respondents, both in a social (36) and work (27 responses) context. However, most online collaboration undertaken by the respondents is by email (fig 18).

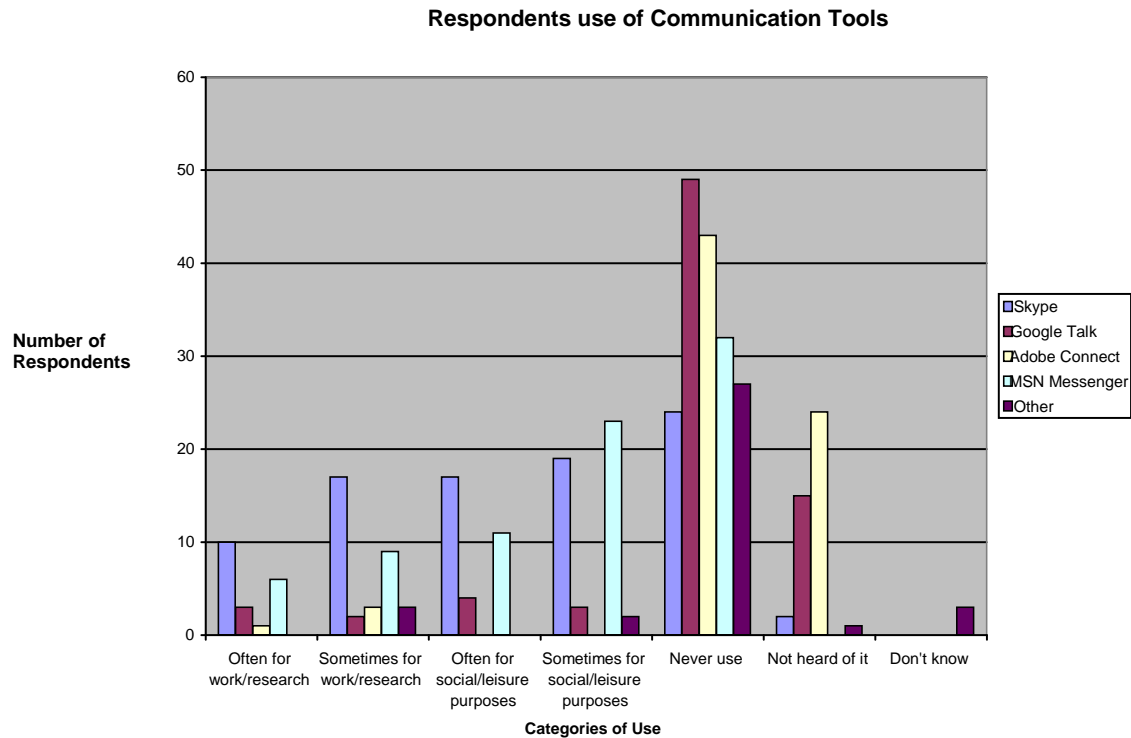


Fig 13: Graph showing Respondents use of Communication Tools

The main motivation for using Social Media and web 2.0 applications

The Respondents main motivation for utilising social media and web 2.0 tools has been highlighted for communication and discussion (39 responses) as well as finding resources (41 responses). This supports the original suggestion that communication tools should be an important aspect of the LinkSphere SN functionality. In order to motivate potential users to use the LinkSphere SN the site should be either better than all the existing services or provide some extra value that cannot be easily obtained from other systems. Utilising the respondents' motivation for finding resources could add value to the SN. The Respondents also felt that they were partial contributors to social media (23 responses) applications.

Main Motivation for Using Social Media and Web 2.0 Applications

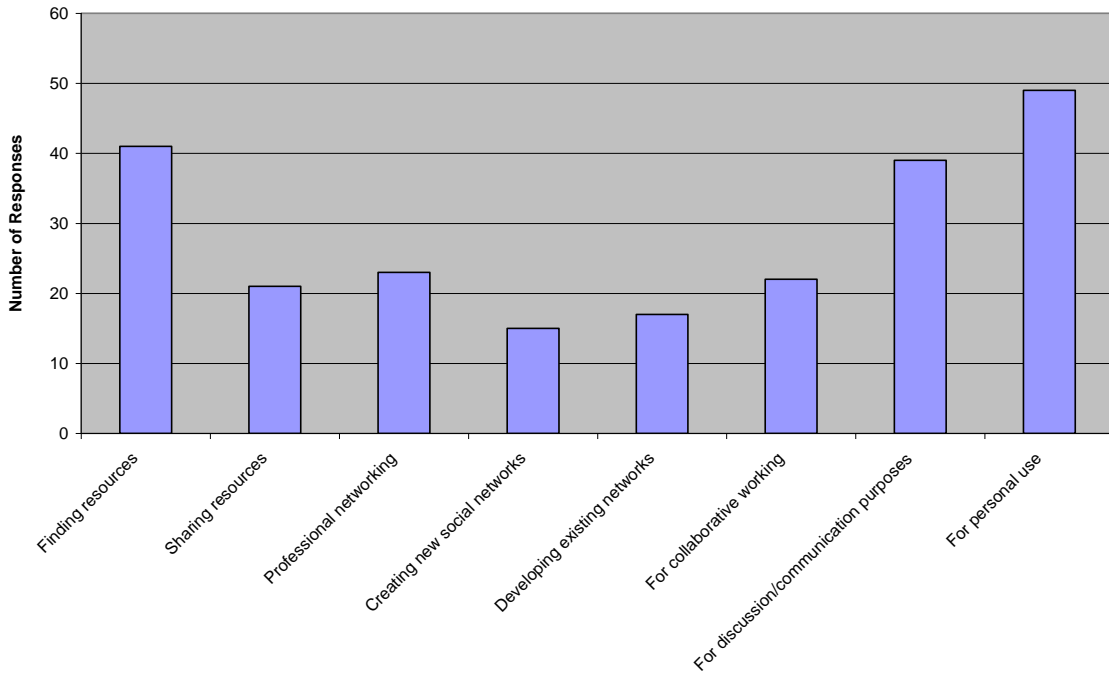


Fig 14: Graph showing the respondents main motivations for using social media applications

Which of the following best describes your activity on social media?

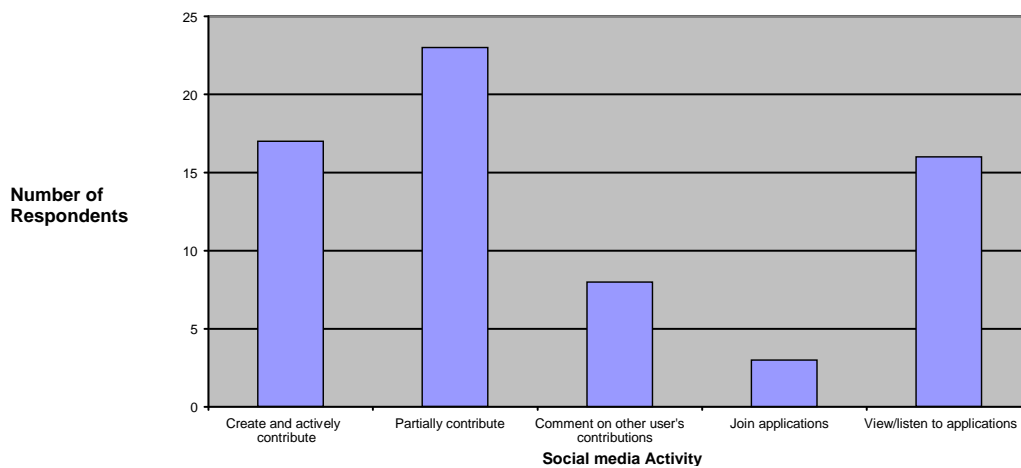


Fig 15: Graph showing how respondents consider their participation activity with social media

Respondent use of Online tools provided by the University or Reading

The majority of respondents use Institutional Email regularly (64 responses), and agreed that a lot of work/research involved online participation (53 responses), however the majority collaborate online via email (63 responses) rather than using another online collaboration tool. Many respondents also use the Library catalogue (38 responses) and Institutional VLE (44 responses) regularly. This could suggest that it might be useful to incorporate both elements of the LinkSphere project together to allow users to access all applications and services in one place.

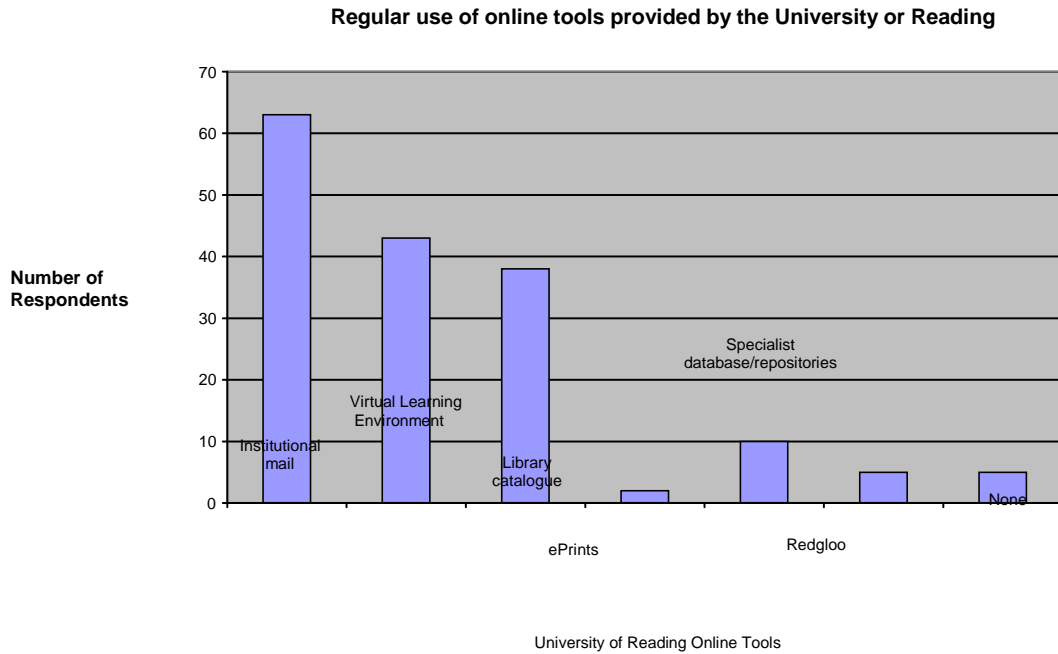


Fig 16: Graph showing use of online tools specifically provided by the University of Reading

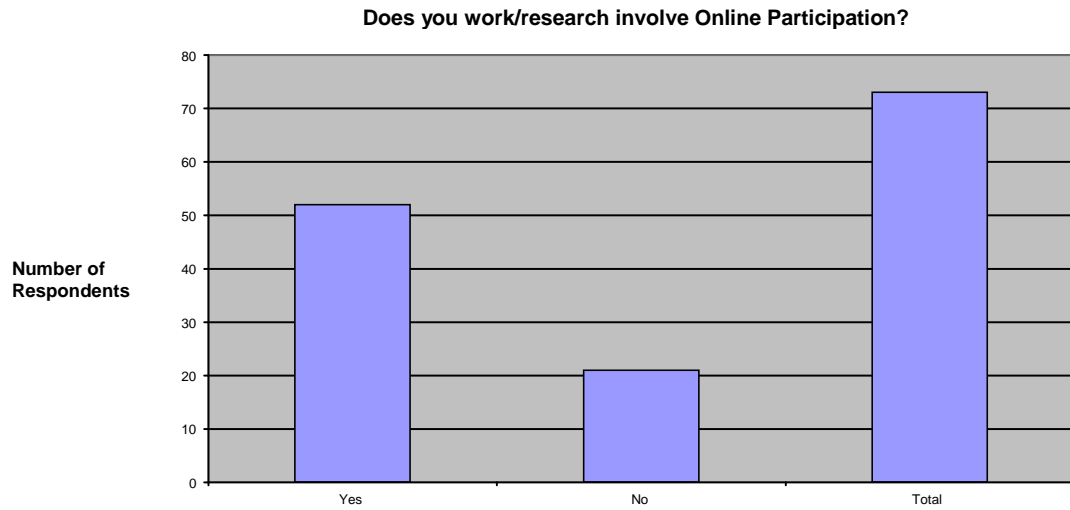


Fig 17: Graph showing how many of the respondents work involves online participation

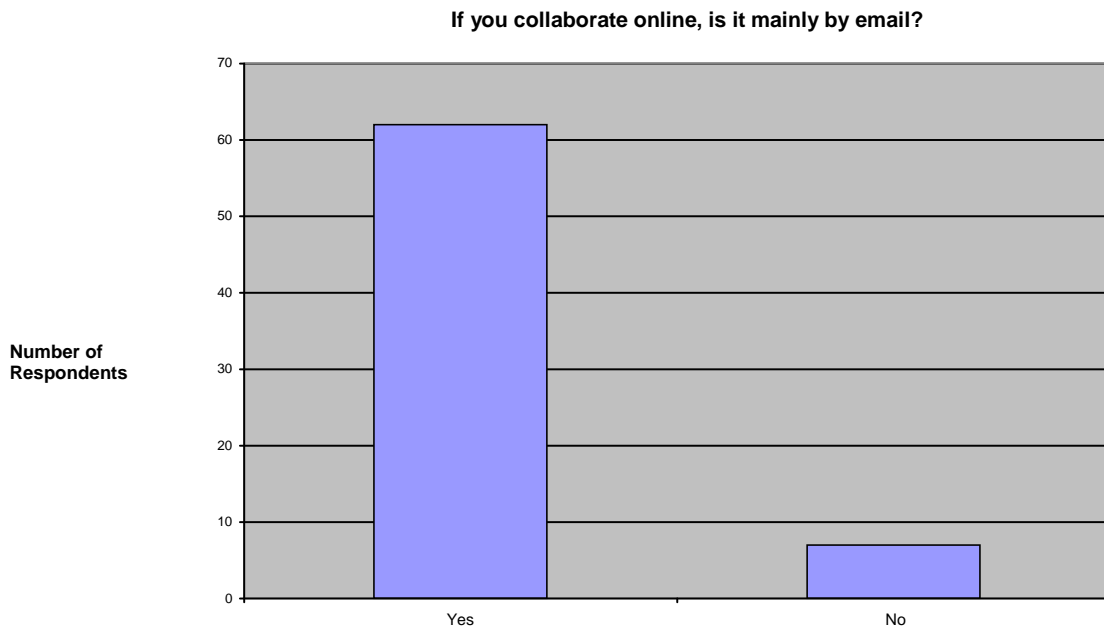


Fig 18: Graph showing that the majority of respondents use email to collaborate online

Web 2.0 functionality

Respondents were asked to comment upon what aspects of web 2.0 functionality they found useful in their work; several commented upon speed and ease of access as very important. Communicating, creating and sharing content, collaborative documents; publishing, disseminating and documenting events that allow contributions from other were also rated highly, as well as the ability to access data from different locations. Whereas what impedes users included: Lack of time, lack of knowledge of specific applications and too many applications to choose from limits use. Therefore the added value for the user should be something unique and not complicated or time consuming.

When asked what functionality they would find useful within the LinkSphere SN comments included:

- ◆ Connectivity to all of the above in an intuitive manner, to accommodate and share research across all forms of media from .pdf > .mpeg etc.
- ◆ I do like Skype so any facility for voluntarily having virtual meetings with video would be good.
- ◆ being able to find out about people with similar research interests and events
- ◆ Discovery of people with similar research interests.
- ◆ I need this type of tool to improve methods of working on service development projects. I will need to be able to give specific, authorised consultants who are not UoR staff access from time to time. I also need an option to keep some material confidential. Direct link to MS Exchange email is vital, so that you do not have to log in to see the email and you can continue to use Exchange as your main work tool. Tracking changes (what and by whom) and version control of documents (MS Office including MS Project and MS Visio) is also needed.
- ◆ Subject groupings - specific to title rather than generic Options to create cross-campus and cross-university focus groups
- ◆ forming groups with common interests forums privacy settings
- ◆ I find existing channels like Facebook and Twitter highly useful for establishing informal contacts and networks with work colleagues - an institutionally-led network would feel more like a formal space and consequently would not add to this.
- ◆ Easy wiki functionality
- ◆ Email alerts when people upload something useful

- ◆ Interoperability with external sites
- ◆ Ability to categorise and rate usefulness of information
- ◆ Searchable database of ideas with tags
- ◆ Perhaps a plug in to Facebook, where many people already 'live'

LinkSphere

Respondents were specifically asked if they would find a University of Reading specific social networking site useful just over half (57% - 39 responses) believed that a SN would be beneficial, quoting its use for collaboration would be LinkSphere's most beneficial service.

Would you find a University of Reading specific social networking site useful?

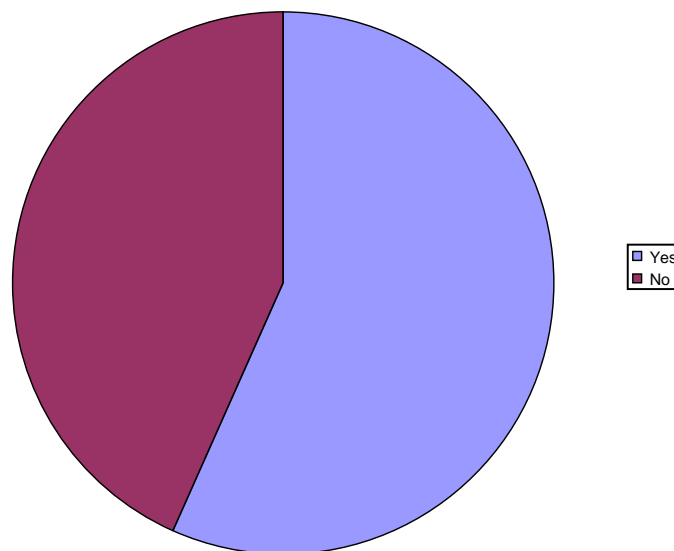


Fig 19: Chart showing that 57% of respondents believe that a University of Reading social networking site will be useful

However the majority of free text responses were negative including:

- ◆ Prefer to talk to real people.
- ◆ Lack of time to use it
- ◆ Do not trust that personal information will be safe
- ◆ Use Facebook instead
- ◆ Work with Reading colleagues is often done face to face or via email - I don't think any other service would really improve the collaboration.

- ◆ Not useful to my job
- ◆ Too confined
- ◆ What is it trying to achieve that isn't out there already?

When asked what name sounds most appropriate for the LinkSphere social network, the top response was 'Research Network' (15 responses) followed by 'Collaborative Space' (14 responses).

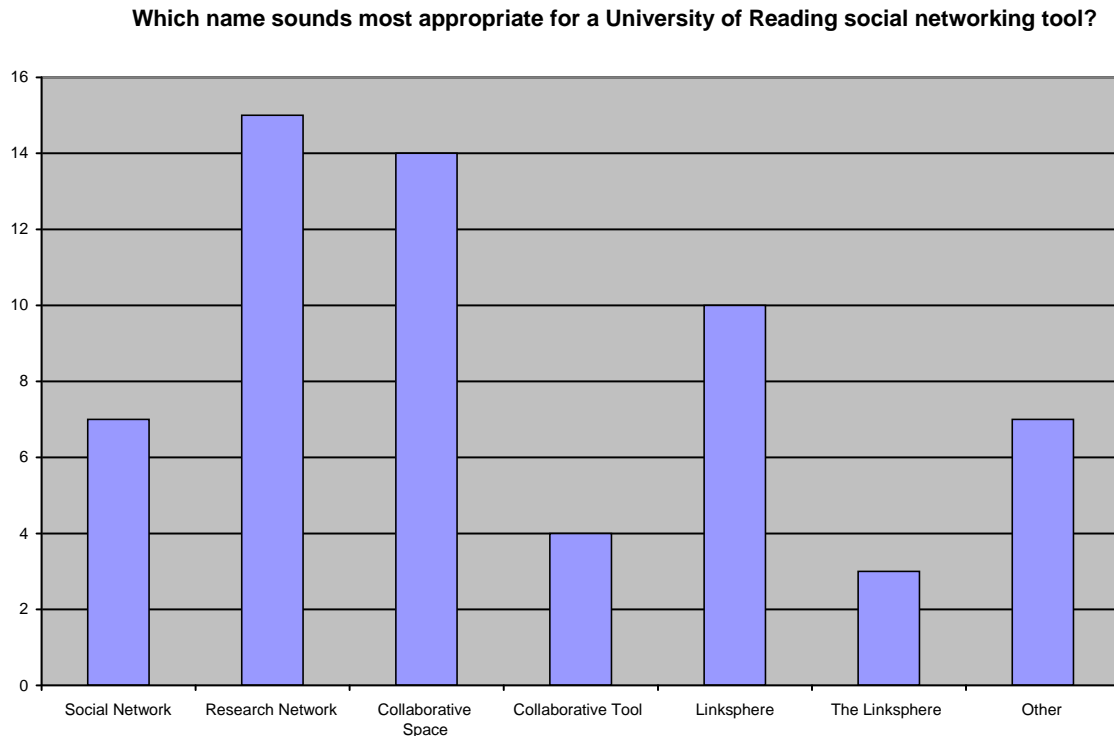


Fig 20: Graph showing the respondents opinions to potential names for the LinkSphere social networking site.

Recommendation for Future Actions

Support

- ◆ Support potential users with how to use web2.0 applications/LinkSphere workshops to increase uptake, prove academic worth and create trust.

Numerous respondents commented that they do not understand enough about web 2.0 technology, or know enough about LinkSphere itself. Managing public expectations is important, more emphasis should be placed on telling University of Reading staff about the project, its services and the academic worth of utilising the services that will be provided.

A key issue is also trust and privacy. Support must be put in place to help staff understand and work in a VRE.

It is therefore recommended that new courses and guidelines are created and run the LinkSphere team, that focus on the key skills to do with creating online content, utilising web2.0 applications, and how to achieve open and private content within LinkSphere. By creating and disseminating guidance for the use of LinkSphere it will encourage potential users to engage with the services provided and will enhance the presence of LinkSphere.

Rename

- ◆ Rename the system as LinkSphere Research Network or LinkSphere Collaborative Space

The current name of LinkSphere doesn't provide any information about what it is actually for and what service it provides to its potential users, which is confusing. An extended name seems necessary.

Better communication about what LinkSphere is and how it will benefit potential users goes with this name change.

Include

- ◆ Include wiki functionality to enable co author work collaboratively within LinkSphere.
- ◆ Link to or embed University of Reading Library Catalogue and institutional VLE, as well institutional email.

Respondents commented upon speed and ease of access as very important web 2.0 functionality. Communicating, creating and sharing content, collaborative documents; publishing, disseminating and documenting events that allow contributions from other were also rated highly, as well as the ability to access data from different locations. Therefore it is important to include tools and services that enable users to access all applications and services they require in one place.

Investigate

- ◆ Investigate Ning, LinkedIn and Facebook for functionality ideas to incorporate into LinkSphere

It needs to be recognised and communicated to potential users that LinkSphere or any University wide social network would never replace what is commercially available, but there may be specific benefits to an internal system that external providers do not have; particularly issues with trust and privacy.

The next stage of usability research will focus on user testing and observations of the digital prototype, predominately looking at the functionality of the LinkSphere system. Deeper analysis of user requirements will be undertaken once user observations have been completed.

Appendix 3: Initial Institutional Repositories User Requirements survey

LinkSphere Project Research Report: Institutional Repositories User Requirements Preliminary Findings

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March 2010

Executive Summary

The University of Reading has a large number of important repositories of scholarly publishing, archival data and museum collections. The LinkSphere project, a collaborative project between the University of Reading and University College London, aims to create a unified system that provides a single virtual interface for searching across all the Universities repositories and collections. University College London is focusing on the usability and functionality of institutional repositories (IR). By addressing user needs and requirements, the integration of user led design and evaluation will aid the development of a unified system for searching across all the repositories and collections, this will not only make the data and information more readily available, but also ensure that all the resources that need to be accessed would be easier to find and interact with.

To date most research into the use of digital resources within repositories has focused on the impact for formal scholarly publishing. The purpose of this research is to discover the use of IRs and the potential impact of a cross repositories with particular focus on usability and functionality. Here, an initial set of results are offered, based on investigative interviews and an online survey with a variety of repository managers, concerning the development of their repositories and their opinions on how a unified system of cross repository searching will enhance access and promote new modes of academic communication and collaboration.

The LinkSphere project usability team produced an online survey and undertook interviews with the key institutional repository managers at the University of Reading in January and February 2010. The aim was to gauge the development of the disparate repositories and collections, their current usability and their opinions on the LinkSphere project, and recommend actions based on the information gathered.

Questions were asked ranging from background details about the repository, digital resources, users, cross database searching and the perceived impact and benefit of LinkSphere.

Analysis of the survey responses and interviews produced a series of issues:

- None of the repository managers could provide a definitive count of digital items
- Concern has been raised about open access to closed collections, particularly copyright
- Many types of the materials collected in a repository are actually not for dissemination but rather for internal teaching, management, storage and preservation, this additionally brings issues about metadata and the process of developing a systematic and standardised vocabulary across all the different types of digital resources within the IR's.
- None of the repository managers had a clear concept of how LinkSphere would work and how it had a specific benefit to their repositories. In order to gain support from all of the repository managers involved in the LinkSphere project a regular and consistent contact time should be established.

Introduction Aims and Objectives

User centric design explicitly and actively includes users in the development process from an early stage. Focusing on user requirements will enable the LinkSphere project to become embedded and owned by the users, creating a comprehensive cross repository system designed to the requirements of the users. The results of this work should provide us with further insight into the use of digital resources within Reading's diverse institutional repositories and help to find appropriate methodologies to detect and evaluate their impact as well as establish the benefit to the IR's of a cross repository system. The results will be fed directly into the development of the LinkSphere system.

An initial user requirements survey was necessary, the survey forms part of the gathering user experience phase; providing the project team with an understanding of LinkSphere's potential users, their motivations, environment and experience.

The LinkSphere project usability team survey was circulated to all the University of Reading Repositories involved in the LinkSphere Project in January and February 2010. The aim of the survey was to:

- ◆ To gather background information about the set up of the disparate IR's
- ◆ To gain a better understanding of repository content and repository practice.
- ◆ Identify core users of the current the IR's
- ◆ To provide a benchmark for their opinions and knowledge about a range of developmental and usability issues with regard to the repositories they administrate

The online survey provided data about the repository origins, development and use. In order to gather more in depth information about issues such as the type of relationship between repository current use and future plans and the policies and processes in place, interviews were conducted with the repository managers. The main aims of the interviews were to:

- ◆ To gather in depth information about the origin and development of the IR's
- ◆ To collect opinions about the LinkSphere project and how it could benefit the IR's

Methodology

The online survey was designed to gather data specifically on University of Reading Institutional Repositories origins, development and current users. The survey was divided into 17 questions, comprised multiple choice open ended questions and free text comments, in order to gain insights into the individual repositories attitudes towards different types of materials and their repository content policies and objectives.

The interviews were semi-structured, open-ended and relatively informal in design in order to encourage repository managers to discuss specific themes at length, including repository specific experiences, thoughts and opinions. It also allowed the interviewer to follow up any particular themes or issues that arose. However, it was important to use an interview script in order to ensure similar coverage of data collection for variables across all repositories involved.

To date 6 survey responses and 8 interviews have been collected.

For the purpose of this research a broad definition of institutional repository was adopted to encompass museum collections, archive material, teaching collections and library catalogues

Findings

In order to contextualize the results from the survey and the interviews, the initial questions on origins and number of objects, aimed to provide contextual information about the repositories, this data was then supported with additional data from repository managers or through links. This information is important to place the subsequent results within context in order to inform the analysis of the results and future development of LinkSphere.

Out of the ten distinct repositories approached, 6 responded to the survey and 8 took part in the interview. The Library and the Beckett Collection agreed to discuss their repositories in person, rather than fill out the online survey (fig 1).

Online Survey	Interview
Film, Theatre and Television audio-visual collection	Film, Theatre and Television audio-visual collection
Ure Museum Database	Ure Museum Database
CentAur	CentAur
Museum of English Rural Life	Museum of English Rural Life
The Silchester IADB	The Silchester IADB
Typography Collection	Typography Collection
	Beckett Collection
	Library Services

Fig 1: Institutional Repositories which responded to the survey and follow up Interview

Repository stage development

Repository managers were asked to classify the development of their repository according to four different time phases: less than a year, 4-5 years, 5-10 years or more than ten years (fig 2), from this it possible to categorise the repositories into three different stages: Recently launched/Initial stage, operational repository, fully established repository. No definition for these different stages or time phases was provided but the question presented no difficulties during the survey and interviews, as the categories are fairly self-explanatory. Three of the repositories in question are classed as a fully established repository being in use for more than ten years, two repositories are operational and one is in the initial stages, only being launched in January 2010. From the interview data it is possible to categorise six repositories as fully established, one recently launched and two were considered as operational. Within this, only five are available online.

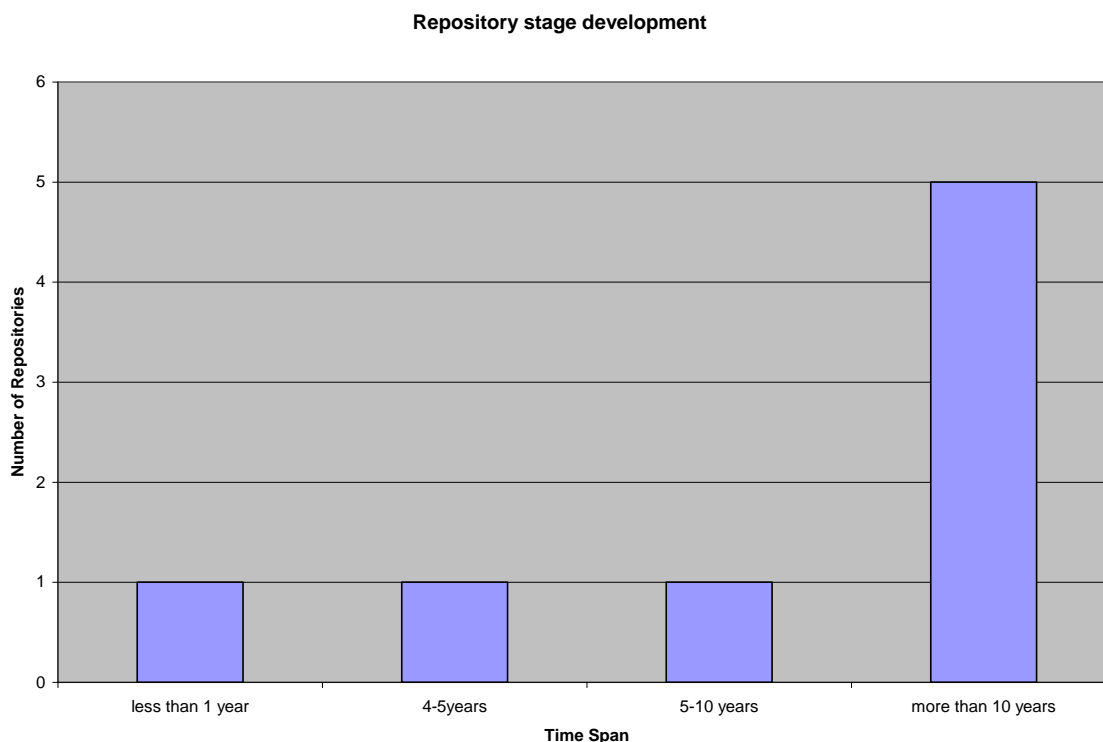


Fig 2: Graph showing repository stage development in years

In the case of the data collected from the online survey, one of the main limitations is that repository managers were not asked to define the type of repository that they were running in their own words and in retrospect this would have been a useful question to ask, as in one instance the term repository proved a problem for a respondent. This means that the data collected could be about a 'traditional' IR or another type, such as a subject repository or library catalogue. However, respondents named the repository and provided a URL where possible. Therefore the broad definition could prove to be problematic.

Repository origins

Respondents were asked in the survey about why the repository was set up, a number of categories were presented to the respondents, the opportunity was given to rate the importance for their repository (fig 3)

The categories were as follows:

- preservation of digital resources
- enhance access to resources
- aid departmental information management
- promote data sharing
- promote new modes of publication

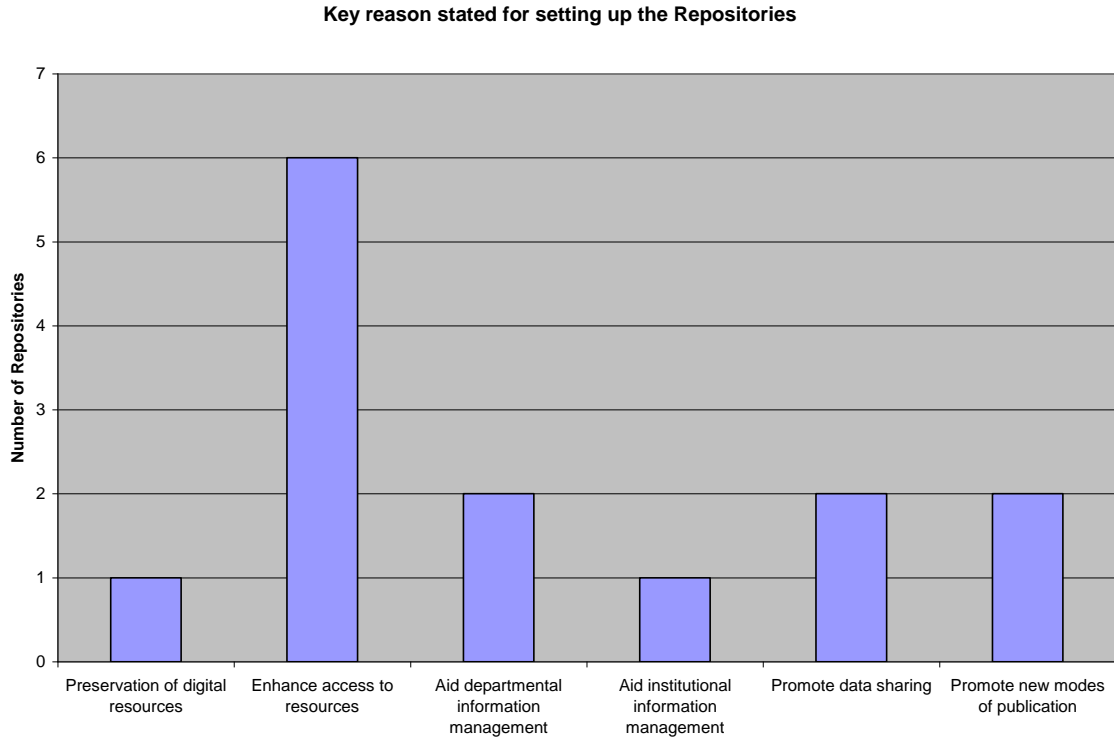


Fig 3: Graph showing enhancing access to resources to be a key reason for all repositories being set up.

During the interviews repository managers were asked to speak in more detail about the origins of the repository, why it had been created and how the initial items were collected. It was felt that gaining insights into the history and early motivation for creating the repository could be key to its development and future involvement in the LinkSphere project. As well as to provide an understanding as to whether the repository managers considered their repository to be user driven.

The most relevant statement, according to survey, was using them as a form of enhancing access to resources. When reviewing the interview data, although this was not a specific question, repository objectives or functionality to enhance or open access emerged as a major theme as repository managers described their repositories.

"I had to look at this object through glass, and that's not acceptable, partly because of that experience I was driven to make such a resource available either to people who aren't lucky enough to fly from the other side of the world...or to people who actually came...handling the objects isn't really that useful if you're not able to follow up this is where, partly because my experience, I knew that digital was a way to go, not the way, but a way because they are all complimentary."

In order to gain an impression of size, repository managers were asked to indicate the number of items held within the repository (see Fig 4 and 5). Some repositories only contain bibliographic references, or links out to external content, one repository (Film collection) only holds records on excel spreadsheets, and has a lack of complete data for each item. Although some of the repositories seem to be quite large, in terms of actual digital content it can contain little. Therefore knowledge about number records for items within the repositories is lacking. This problem of counting items did not come up in the survey data but was very apparent in the interviews. Repository managers were asked to confirm the number of items that they had indicated when responding the survey and all had some kind of comment to make about forms of counting, and none had a definitive number.

Do you have a way of quantifying what you've got in terms of type of record?

"Probably not! If I'm honest. The library database is so simple it gives a running total; there are probably about 4000 records on that. The other collections database, we are hoping to tweak it...haven't really figured out a way of determining how many records are on it."

The survey specifically asked what percentage of the repository was digitised; four repositories have fewer than 10% of their collection digitised.

Number of objects held within the Institutional Repository - Survey Responses

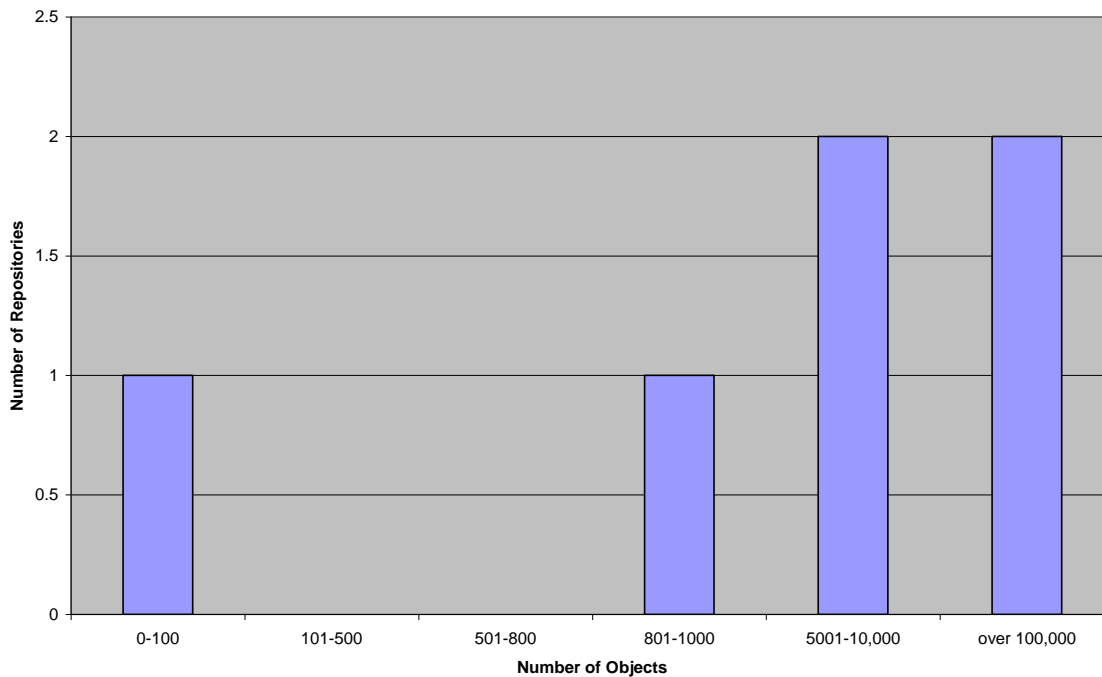


Fig 4: Graph showing the range of repository sizes in term of number of objects held.

Number of objects held within the Institutional Repository - Interview Responses

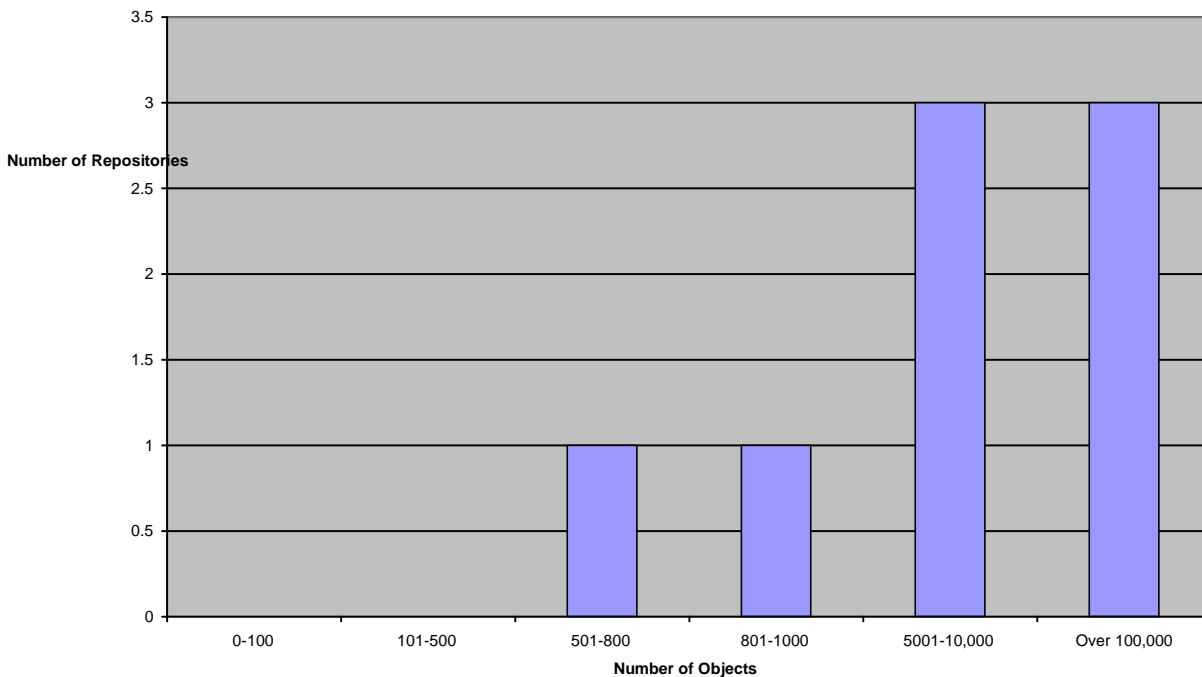


Fig 5: Graph showing interview responses to number of objects held

One of the consequences of expanding the definition of a repository to encompass all of the University of Reading's disparate collections is that in terms of the LinkSphere project many types of the materials collected in a repository are actually not for dissemination but rather for internal teaching, management, storage and preservation. This is likely to cause problems for levels of access to cross repository searching of the data. Open access to repository data was raised as an issue by several repositories:

“ That’s one of the questions I’ve got about LinkSphere, how, not hold back information, but how do you filter it, and how do you, obviously make it accessible, but I’m, not quite sure how it works and how other collections will be doing the same.”

“...Legality, we certainly couldn’t serve out streams of video to just anyone because we don’t own the copyright of any of this stuff, we only have it for educational [internal department] use”

These types of materials may have severe restrictions on their dissemination due to a number of reasons, particularly copyright of material. This is a key issue that will have to be addressed by the LinkSphere project if all repositories in question are going to be able to openly access and disseminate data from their repositories.

Digital Resources

In the survey, respondents were asked what types of materials were contained within their repository. The categories provided were as follows:

- ◆ administrative documents
- ◆ audio-visual materials and multimedia
- ◆ books and book chapters
- ◆ conference proceedings
- ◆ datasets and databases
- ◆ images, maps, diagrams
- ◆ museum objects
- ◆ patents
- ◆ pre/post prints
- ◆ references/bibliographies
- ◆ reports
- ◆ software
- ◆ theses and dissertations
- ◆ working papers
- ◆ other (please specify below)

Respondents could select as many item types as they wanted and Figure 6 shows the amount of repositories containing certain resource types.

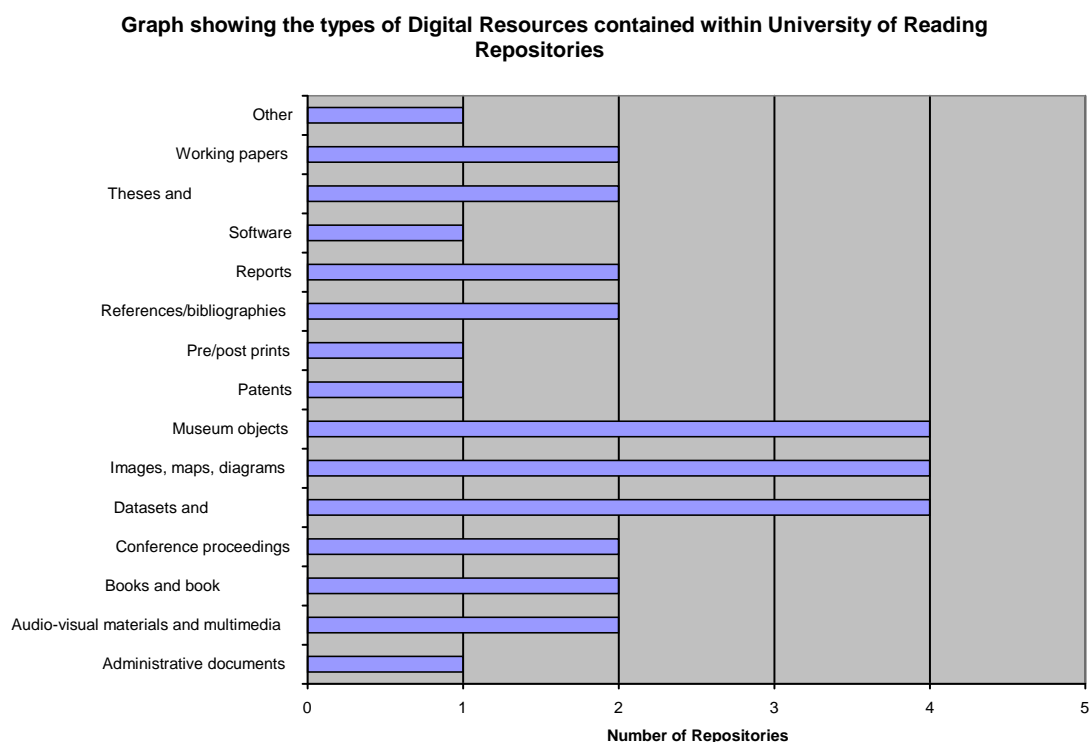


Fig 6: Graph showing the different types of digital resources contained within the repositories

The most common type of resources held within repositories were datasets and databases, images, maps, diagrams and museum objects. This again raises the issue for the LinkSphere project. Many types of the materials collected in a repository are actually not for dissemination but rather for internal teaching, management, storage and preservation, this additionally brings issues about metadata and the process of developing a systematic and standardised vocabulary across all the different types of digital resources within the IR's. Administrative papers, pre and post print papers are predominantly held within the CentAUR repository, the only repository involved in the LinkSphere project which is hosting paper based digital equivalents which are well embodied in the scholarly communication process.

Current Usability

Perceptions on usage

In the survey, repository administrators were asked if they considered that the materials within their repositories were used frequently (fig 7) and by whom (fig 8). In the Interview this question was followed up with more detailed information about how they knew this.

How often is your Repository used?

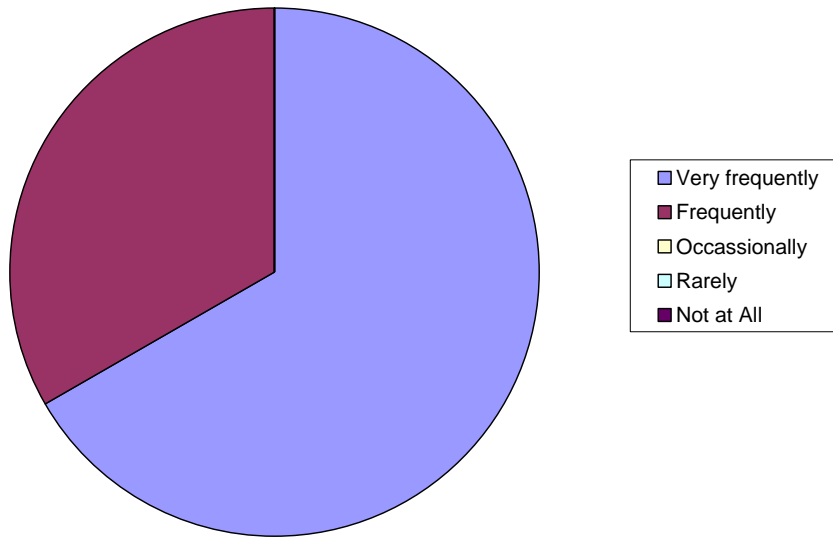


Fig 7: Chart indicating that the majority of repositories are used very frequently

Number of Repositories

Graph showing the Users of the Repositories

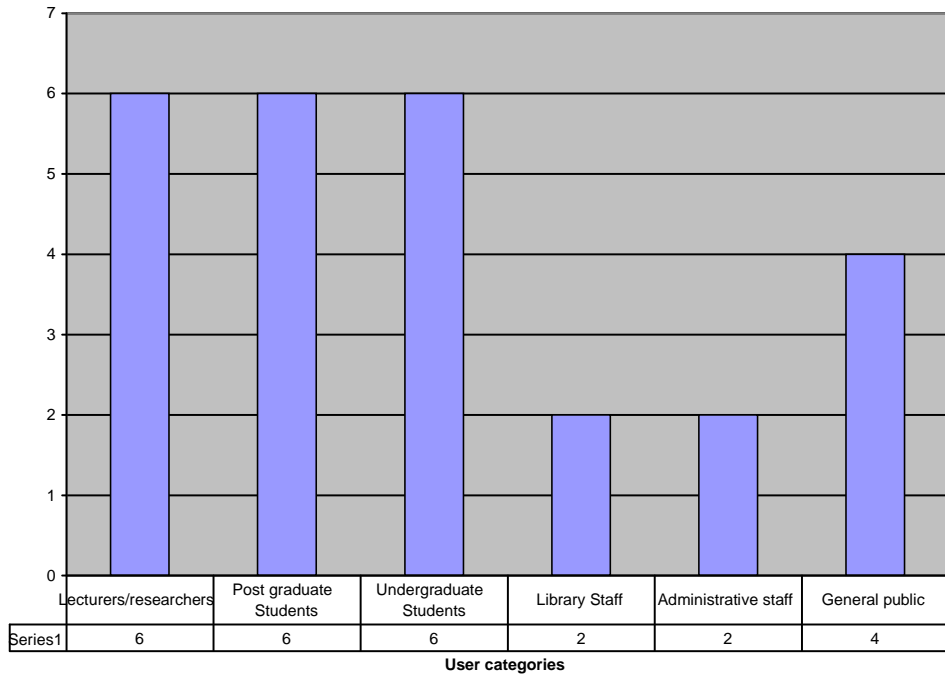


Fig 8: Graph showing the main users of the repositories

Respondents were then asked how this usage was monitored and given several options: download counts, Google analytics, link analysis, log analysis and user surveys (fig 9). A free text option was also available.

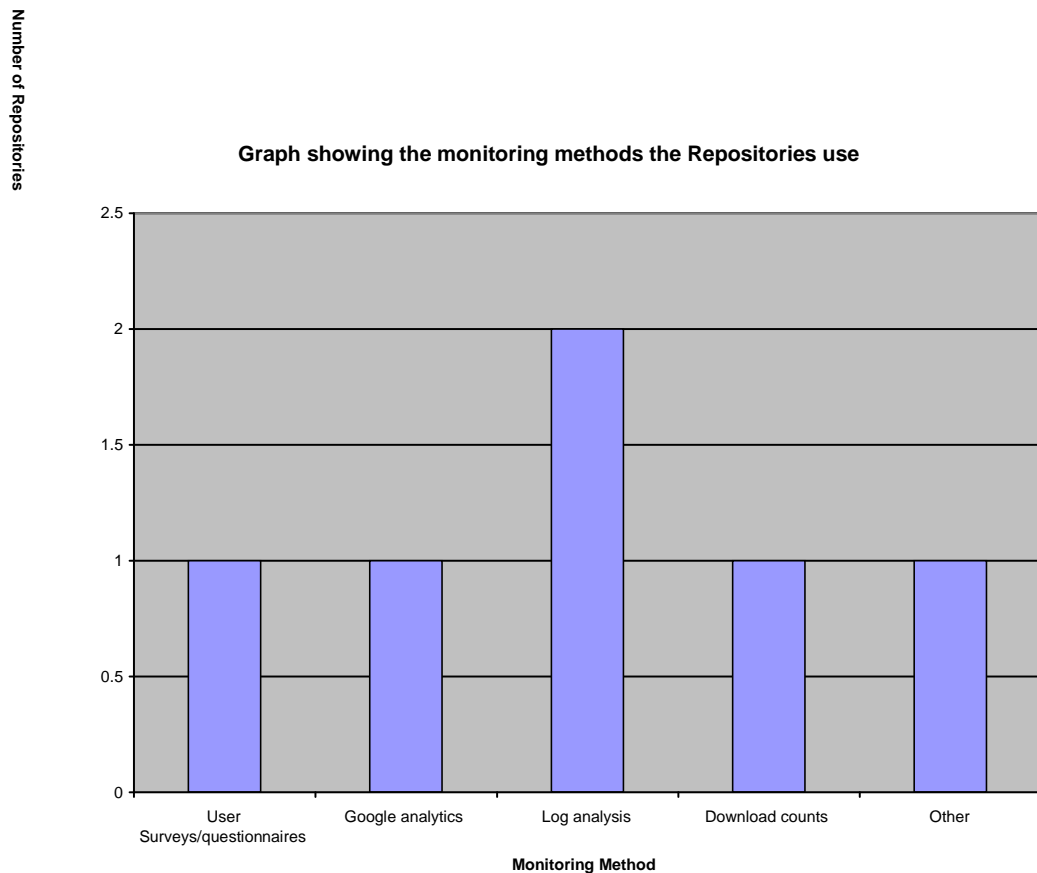


Fig 9: Graph showing the monitoring method the repositories use

However, it is interesting to note how all of the repository managers were quite confident in asserting that resources were well used, both from the survey and interviews. However, none of the repositories managers when asked how they monitored usage could produce any statistics of use.

“The museum itself has stats, when we paid attention to the stats in the beginning, in 2002 it was just interesting to see...I don’t really have a sense at all of the current stats, I should of looked in the last couple of years...”

All repository managers noted that the monitoring methods were extremely basic. Several repository managers mentioned physical user surveys as well as received emails from individuals thanking them or indicating that certain resources had been useful for their work. This does indicate that there is a demand for the resources that are identified within the repositories. LinkSphere Recommendation – add Google analytics to all online repositories involved in the project, to allow analysis any difference in repository usage after cross repository searching has been activated.

Linksphere

In the interviews repository managers were encouraged to talk about what they perceived the LinkSphere project to be about, potential benefit to their repository and any issues they

may have. The majority of repository managers were unclear as to the main purpose of LinkSphere, many state that they understand LinkSphere to be a social network for research, and are unclear as to how the cross repository search fits in with that.

"I don't really understand it.... I welcome LinkSphere as an opportunity to do something interesting, maybe brings attention to the museum &/or university &/or the collection, that gives us an opportunity to work together better in a digital world. I know it's supposed to do all these things, I just don't know how."

"First impression stopping further away from us then I thought it was... the way that I understood, not necessarily the way that Hugo discussed it was, there would be a single search which would come up with some results, across all of the collections, within the larger project and that might then result in someone knowing that they had to come and talk with us or whatever. I guess I was initially a bit disappointed by that because I'd hoped there might be some way in which the project might be helping us in some way, either put together or sort out or something [repository databases] perhaps that's a bit unrealistic"

This is an issue which should be classified as urgent and important to rectify. If the project is to be successful it requires 'buy in' from the repository stakeholders. Clarification of LinkSphere's role, aim and benefit to the individual repositories involved is required to provide all repository managers with adequate information about the project and their involvement.

Future Usability

To conclude the session, participants were asked tie-up questions surrounding their future plans for the Repository. All the repository managers had clear ideas about how they wanted their repositories to develop. None, of the future plans are considered to impact upon the LinkSphere project.

Conclusion

This initial research aimed to discover the current use of the University of Reading repositories and collections and to ascertain opinions on the potential impact of the LinkSphere project's development of a cross repository search. Two main issues were discovered; firstly, all the repository managers interviewed were unclear as to the main purpose of the LinkSphere project, this issue requires attention by the whole project team. Secondly, open dissemination of repository data was raised as an issue by several repository managers. This needs to be addressed if all the repositories involved in the project are going to be able to provide their data in a cross repository search.

Appendix 4: Plymouth eLearning Conference 2010, workshop abstract

Beyond the sky's limits, is social networking in academia a chance to sample heaven?

There is a growing awareness of the potential use of social networking in education. Personal Learning Networks (Harasim, 1997) are much talked about, and may be seen as the backbone of the networks in Connectivism (Siemens, 2005). The JISC currently has projects investigating social networking in the context of Virtual Research Environments, looking at the benefits which may accrue to research efforts as a result of improved communications.

LinkSphere is a two-strand project, providing a cross-database search functionality on the one hand, and social networking on the other. The workshop will engage participants in discussions about the similarities and differences, if there are differences, between using social networking in education and in research, and attempt to draw out the requirements the participants would have for such a system. Bring your own ambrosia...

Appendix 5: Final Survey:

LinkSphere final survey

The LinkSphere project aimed to provide a social network and cross-collection search engine. Despite many changes being made to respond to user feedback, uptake was never high, and we would like to find out why. If you have not seen the LinkSphere social network before, we would still value your answers. You can have a look at the system (and even use it if you want!) at <http://www.reading.ac.uk/linksphere>

The survey should only take a few minutes to complete, and all answers will be treated as completely anonymous.

Most of the questions are on a Likert 5 point scale, with 1 being "I disagree" and 5 being "I agree". Thank you, in advance, for completing this survey.

Social networking is useful for my work

	1	2	3	4	5	
Disagree						Agree

I already have enough "social media presence" on third-party services

	1	2	3	4	5	
Disagree						Agree

The interface of LinkSphere was confusing

	1	2	3	4	5	
Disagree						Agree

I do not want to use social networking for work-related things

	1	2	3	4	5	
Disagree						Agree

I do not have enough time at work to use a social network site

	1	2	3	4	5	
Disagree						Agree

Social networking would support a sense of community at work

	1	2	3	4	5	
Disagree						Agree

LinkSphere should have provided work related tools

	1	2	3	4	5	
Disagree						Agree

I do not trust any social networking site with my 'stuff'

	1	2	3	4	5	
Disagree						Agree

There were not enough people using LinkSphere to make it interesting

	1	2	3	4	5	
Disagree						Agree

I had trouble logging in to the LinkSphere site

	1	2	3	4	5	
Disagree						Agree

I did not like the look and feel of the LinkSphere site

	1	2	3	4	5	
Disagree						Agree

I need to keep control of the material I post

	1	2	3	4	5	
Disagree						Agree

It is not appropriate to post socially at work

	1	2	3	4	5	
Disagree						Agree

LinkSphere might have been useful if it was totally private

	1	2	3	4	5	
Disagree						Agree

LinkSphere would be useful if you guaranteed it was only research and academic staff accessing it

	1	2	3	4	5	
Disagree						Agree

LinkSphere would only be useful if users included research students

	1	2	3	4	5	
Disagree						Agree

LinkSphere social site should only be social, not related to research aspects of work

	1	2	3	4	5	
Disagree						Agree

LinkSphere social site should only relate to research aspects of work, not include social content

	1	2	3	4	5	
Disagree						Agree

LinkSphere should allow both social and research aspects of work

	1	2	3	4	5	
Disagree						Agree

LinkSphere should be open for students to view

	1	2	3	4	5	
Disagree						Agree

Please let us know any other reasons why you didn't (or would not want to) use LinkSphere

Demographics

Please let us know the following so we can analyse the survey results appropriately

Are you a member of staff/student (please tick all that apply)

- Academic Staff
- Research Staff
- Other staff
- Research Student
- Other student

If you are a member of staff, how long have you worked at the University?

- Less than 1 year
- 1 to 3 years
- 3 to 8 years
- More than 8 years

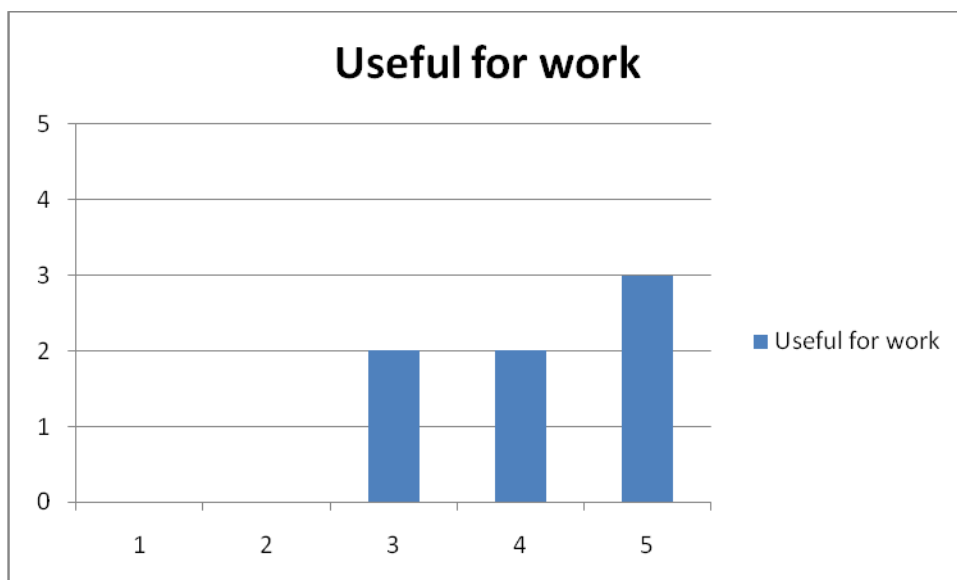
Were you involved in any LinkSphere workshops?

- Yes
- No

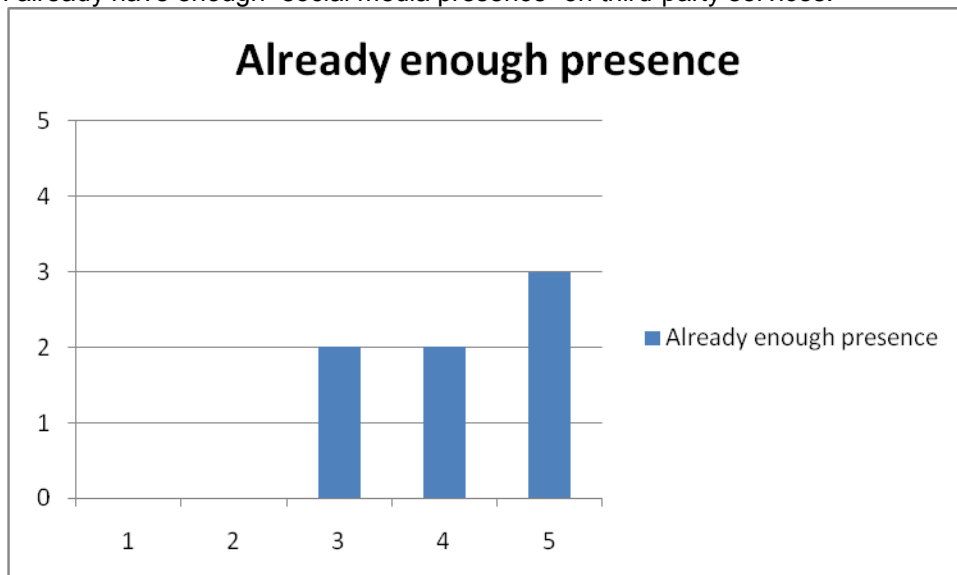
Results:

There were only 7 respondents, so the results are inconclusive. However, they are reported for the sake of completeness. Of these, 2 were Academic staff, 3 Research staff and 2 Research students. None of the staff responding were new staff, all having over 3 years of service at the institution.

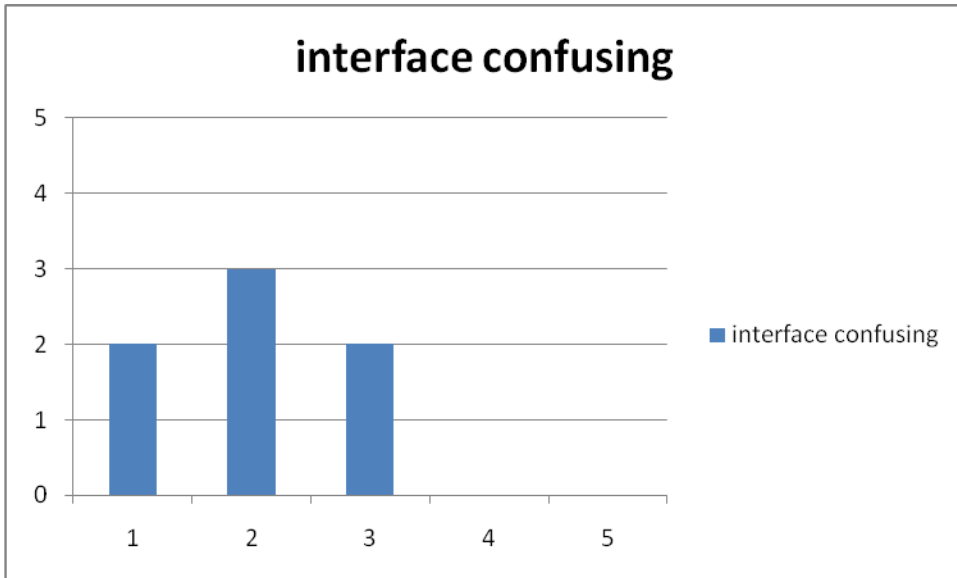
Social Networking is useful for my work:



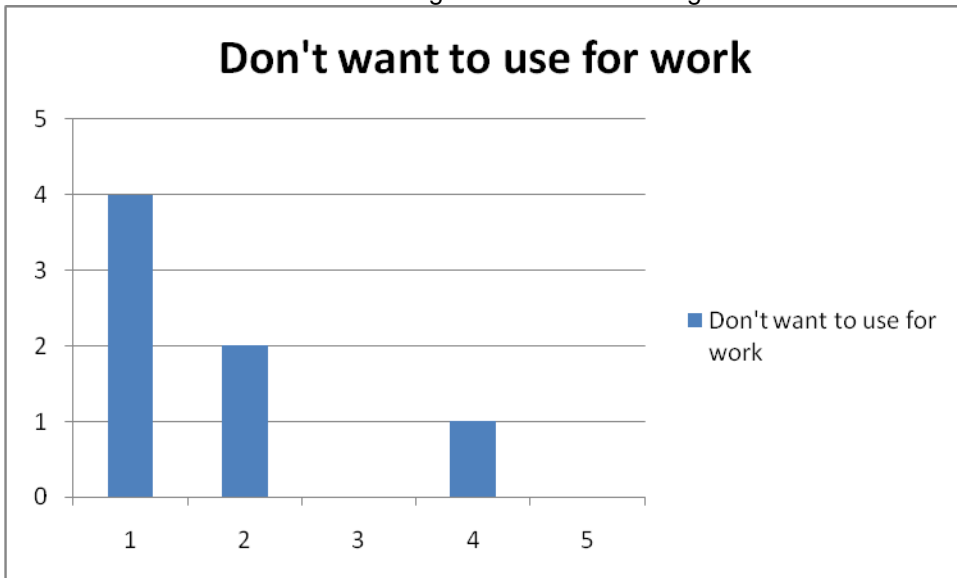
I already have enough "social media presence" on third-party services:



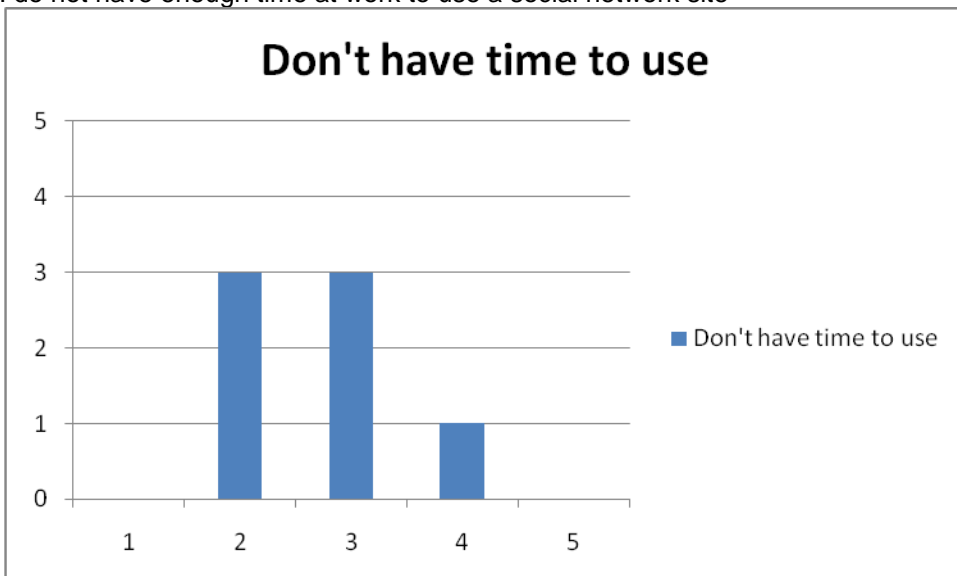
The interface of LinkSphere was confusing:



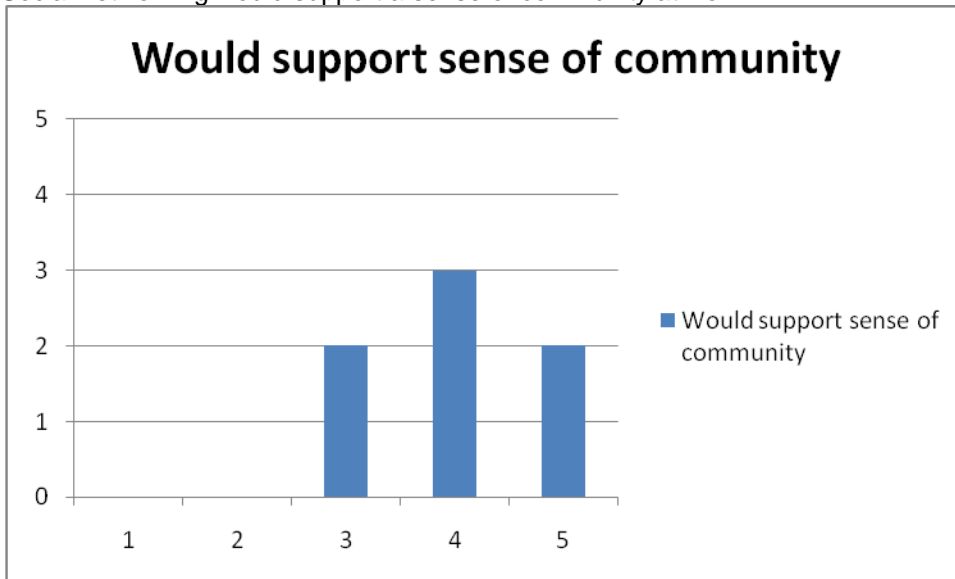
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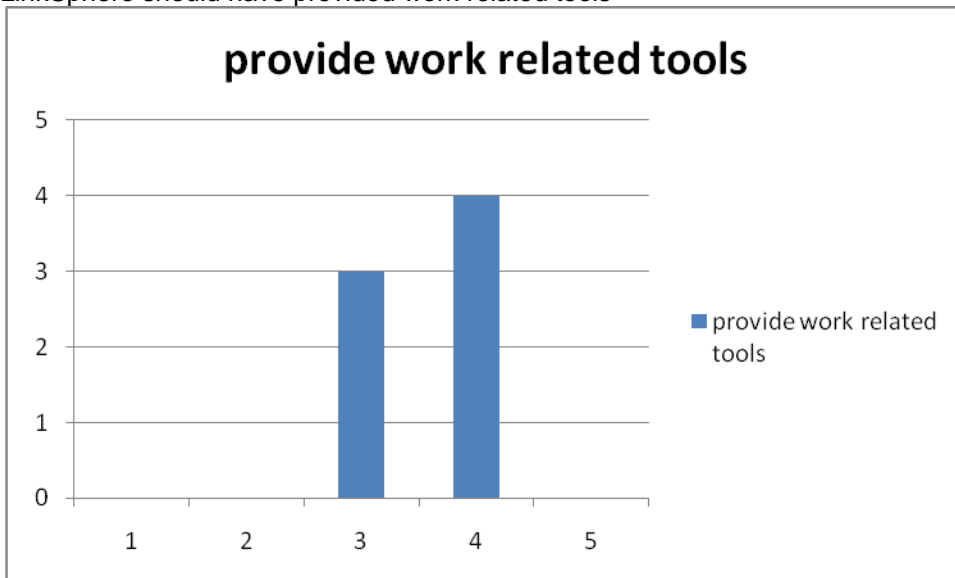
I do not have enough time at work to use a social network site



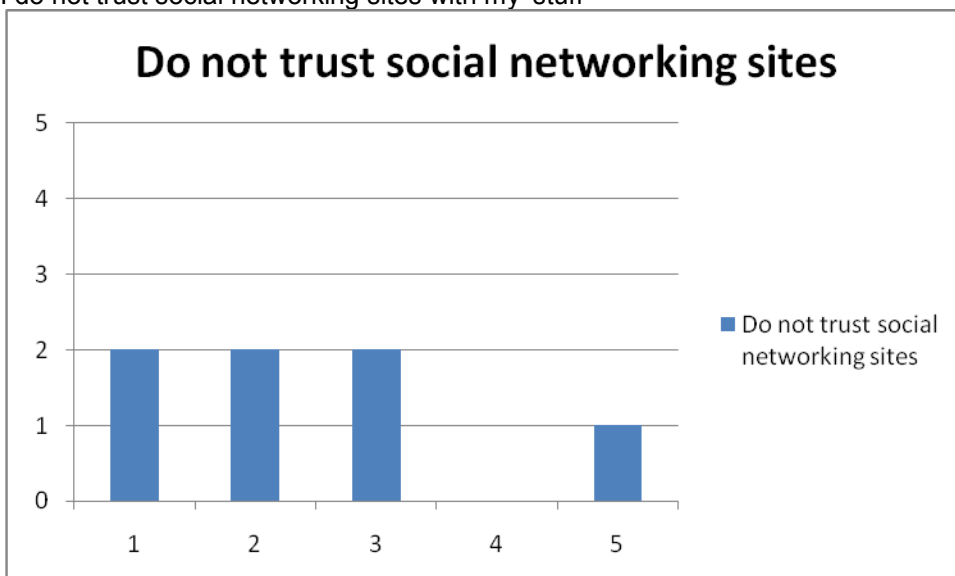
Social networking would support a sense of community at work



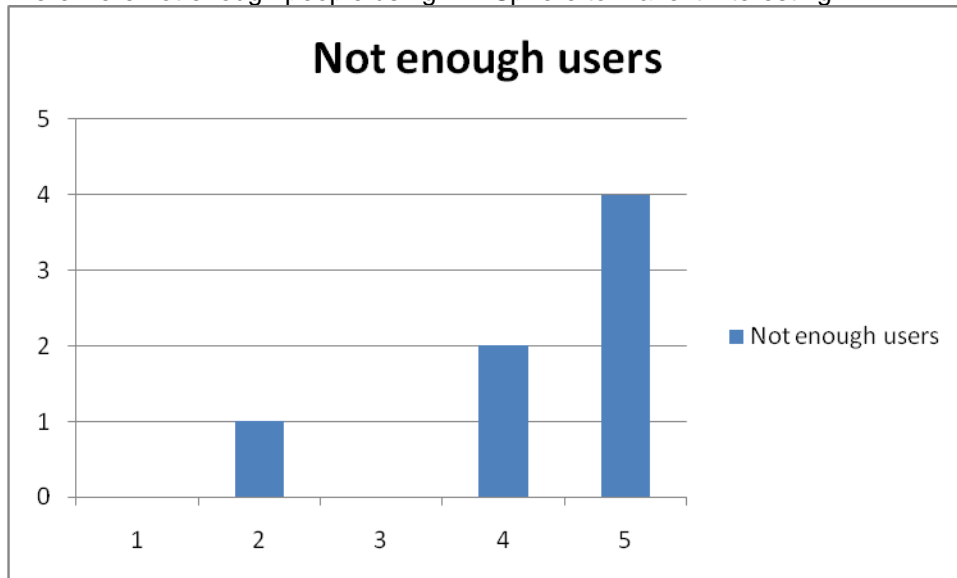
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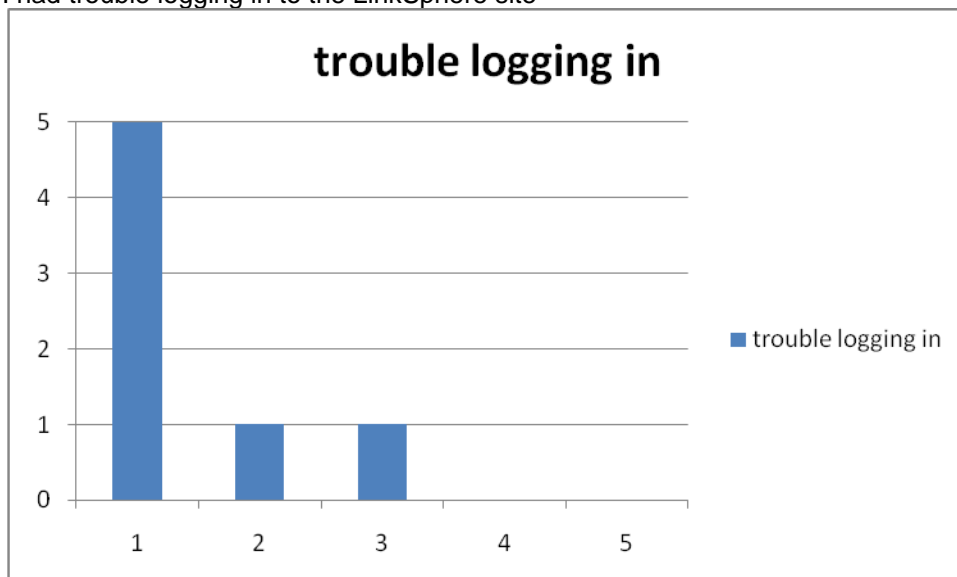
I do not trust social networking sites with my 'stuff'



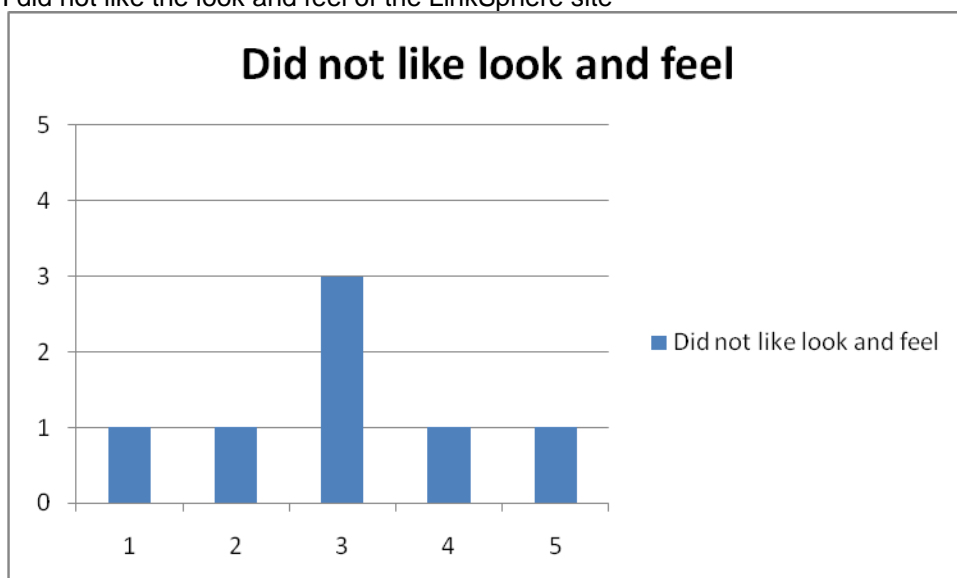
There were not enough people using LinkSphere to make it interesting



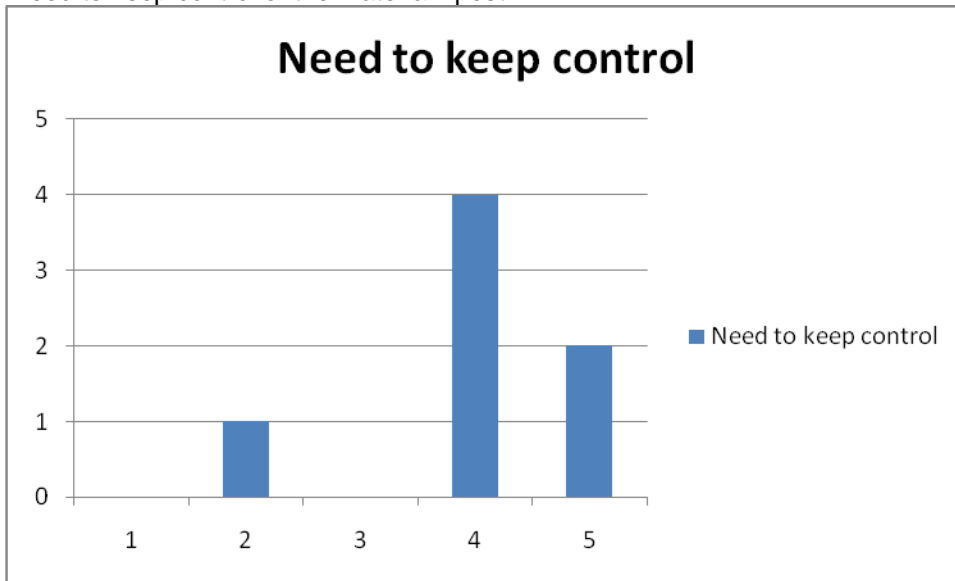
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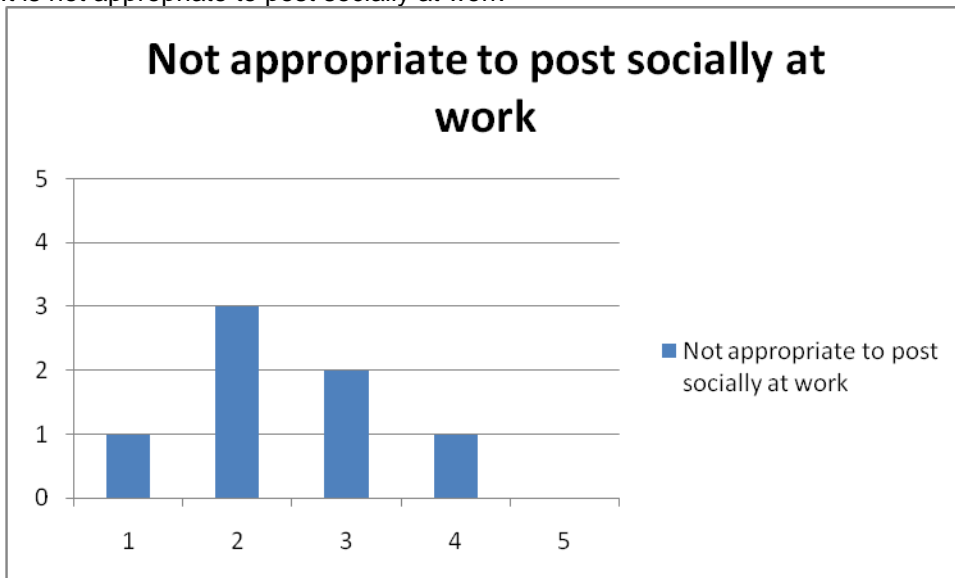
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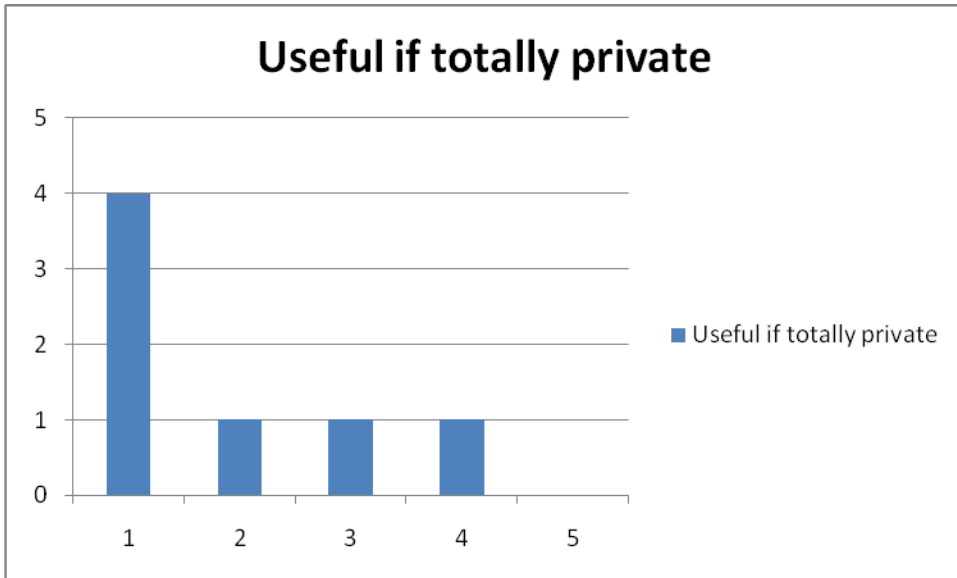
I need to keep control of the material I post



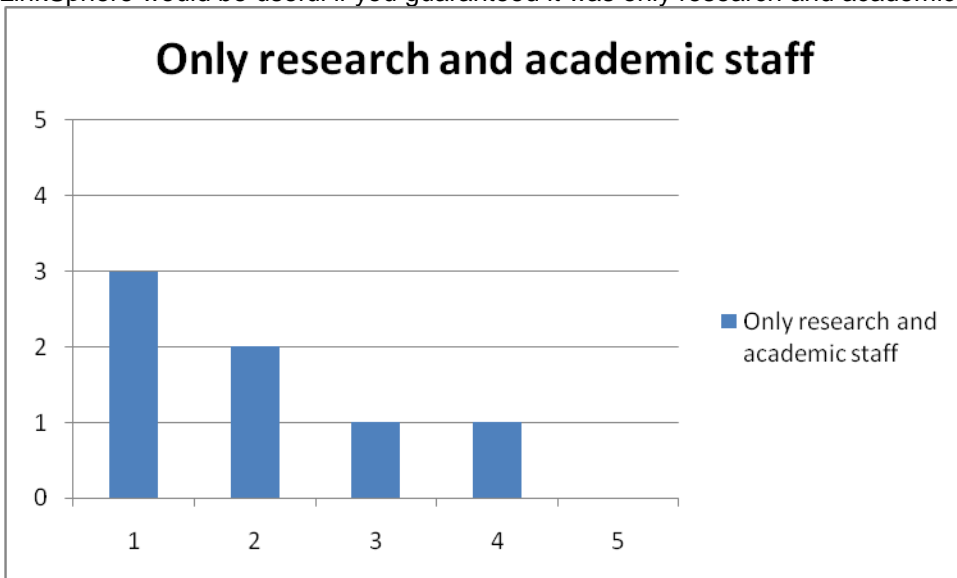
It is not appropriate to post socially at work



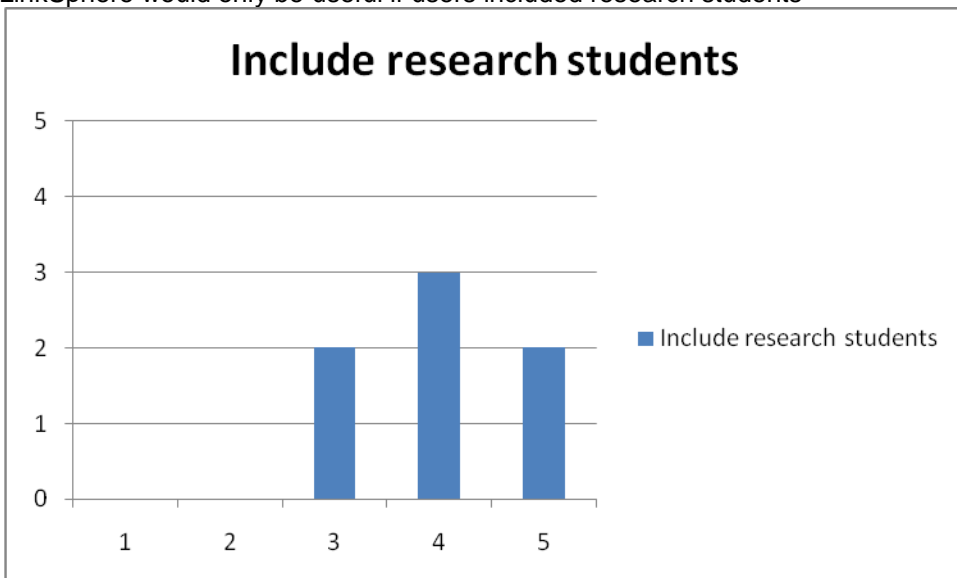
LinkSphere might have been useful if it was totally private



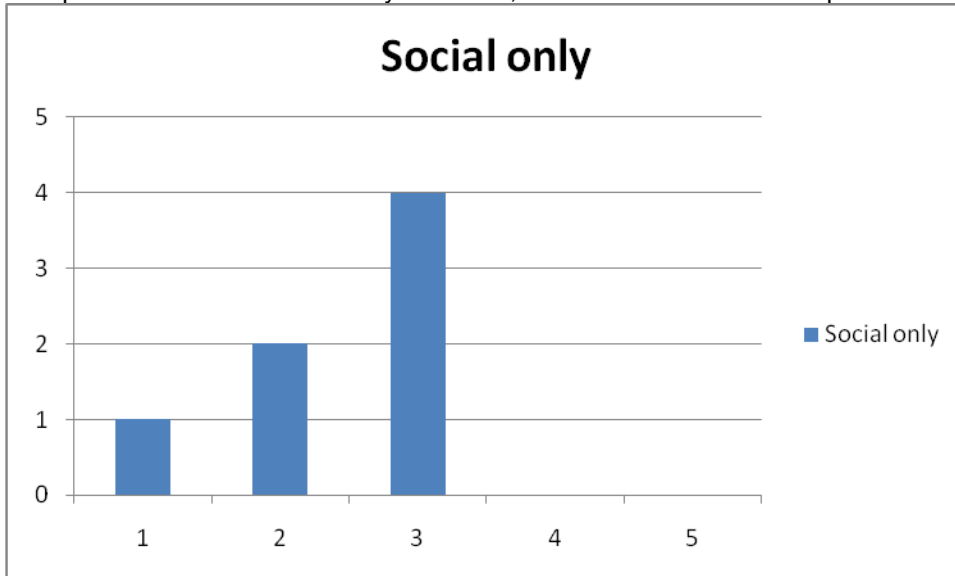
LinkSphere would be useful if you guaranteed it was only research and academic staff accessing it



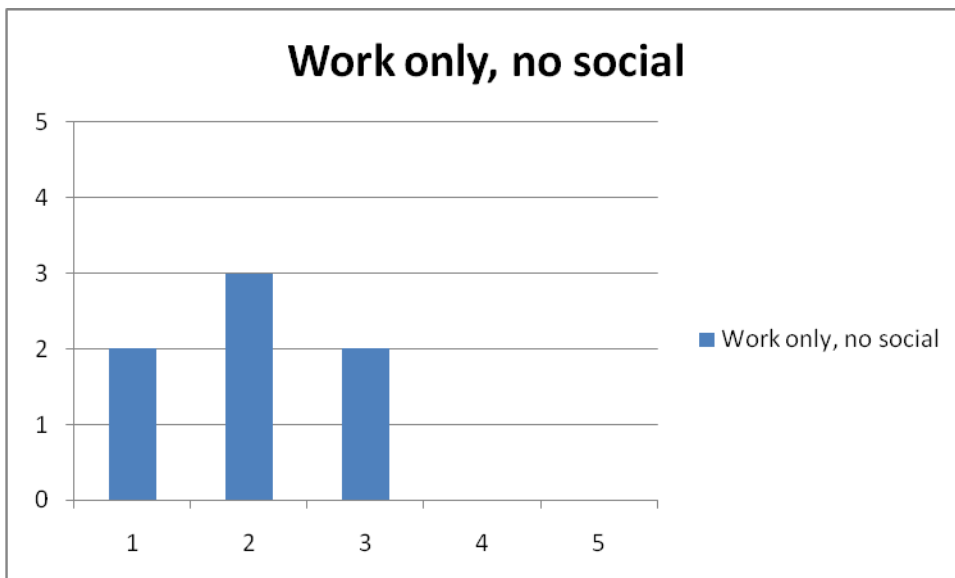
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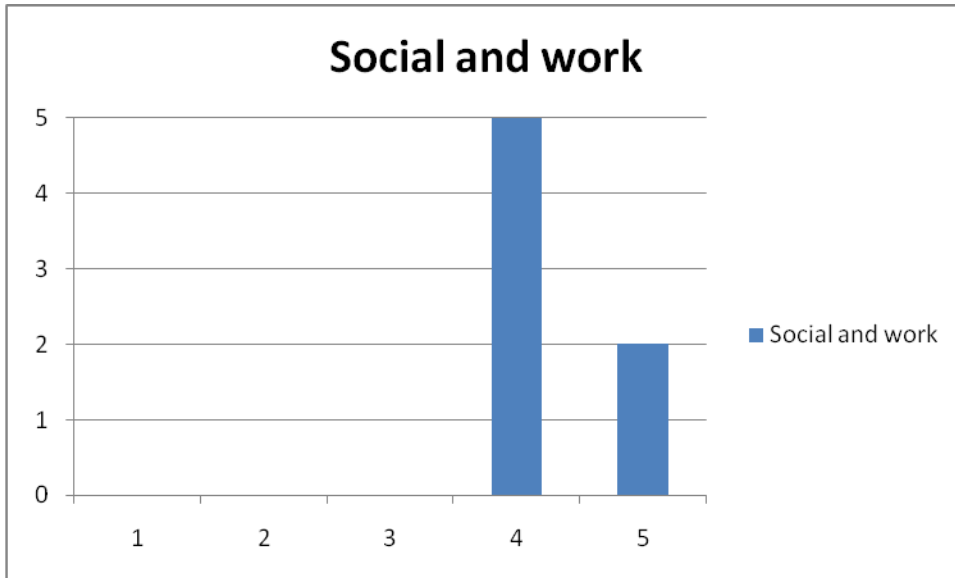
LinkSphere social site should only be social, not related to research aspects of work



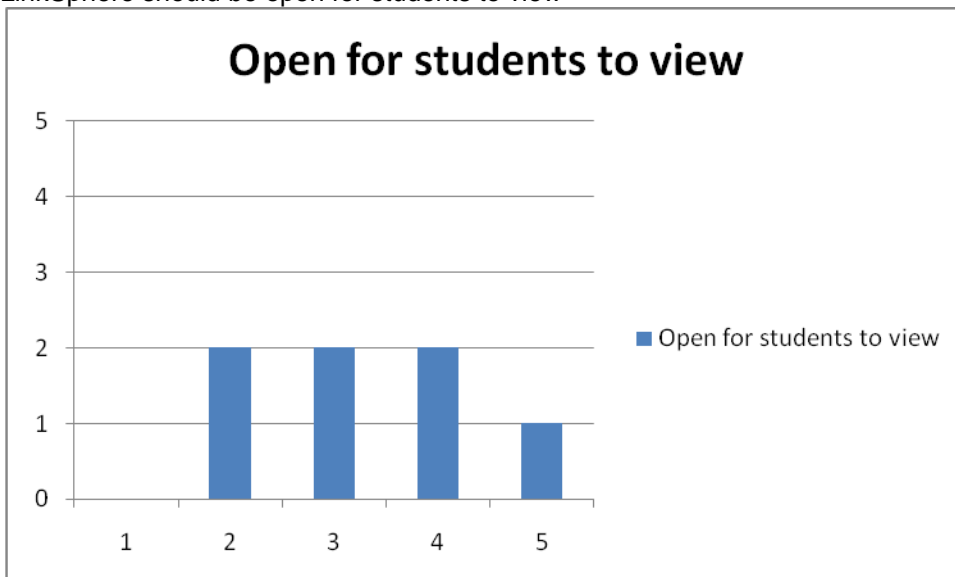
LinkSphere social site should only relate to research aspects of work, not include social content



LinkSphere should allow both social and research aspects of work



LinkSphere should be open for students to view



Appendix 6:

LinkSphere Project Research Report: Social Network User Observations

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Executive Summary

VRE development must be embedded and owned by the communities it serves and cannot realistically be developed by others in isolation (Fraser 2005). The extent to which a VRE can be used to achieve specific tasks effectively, efficiently and with satisfaction is largely driven by the requirements of the user. If sites are not usable, users will leave and find others which better cater to their needs. As a result, effective evaluation techniques are required to determine the usability of web sites. Hence user requirements studies are important (Sim et al 2006). User centric design explicitly and actively includes users in the development process from an early stage. Focusing on

user requirements will enable the LinkSphere project to become embedded and owned by the users, creating a comprehensive collaborative tool specifically designed to the requirements of the users.

This study comprised a series of naturalistic observations; think-aloud observations of academic and research staff took place, with the aim of understanding their use, opinion and information behaviour from interacting with the LinkSphere site. 5 academic and research staff participated in the observation sessions.

Analysis of the observations has produced a series of issues:

- ◆ Login, needs to be relocated.
- ◆ Length of left hand navigation is too long
- ◆ Community is a key concept that all of the participants commented upon.
- ◆ Terminology needs more clarity and/or explanation
- ◆ All mentioned different social environments that they are a part of, particularly LinkedIn
- ◆ Trust and privacy needs to be addressed

Introduction Aims and Objectives

When creating social web sites, as with any software system, it is important to ensure that a high level of usability is attained. The extent to which a VRE can be used to achieve specific tasks effectively, efficiently and with satisfaction is largely driven by the requirements of the user. If sites are not usable, users will leave and find others which better cater to their needs. As a result, effective evaluation techniques providing insights into user requirements are necessary to determine the usability of web sites. User centric design explicitly and actively includes users in the development process from an early stage. Focusing on user requirements will enable the LinkSphere project to become embedded and owned by the users, creating a comprehensive collaborative tool specifically designed to the requirements of the users.

Methodology

This study comprised a series of and naturalistic observations of 5 academic and research staff. A sample size of five user observations can be very productive. As Nielsen (2000) points out:

The best results come from testing no more than five users ...As you add more and more users, you learn less and less because you will keep seeing the same things again and again. After the fifth user, you are wasting your time by observing the same findings repeatedly but not learning much. (Nielsen, 2000).

The data collection and analysis approach focused on observing academics information behaviour and website interactions in as naturalistic a way as was possible within practical constraints. This approach follows on from an initial user requirements survey, which formed part of the gathering user experience phase; providing the project team with an understanding of LinkSphere's potential users, their motivations, environment and experience.

Think-aloud observations of academic and research staff took place, with the aim of understanding their use, opinion and information behaviour from interacting with the LinkSphere site. The users were given the same briefing information, scenarios and task lists. At the beginning of each session, participants were asked general ice-breaker and background questions and were then observed thinking-aloud whilst they interacted with the LinkSphere site, consistent with the Contextual Inquiry approach (see Beyer and Holtzblatt, 1998). Probing questions were asked during the observation to elicit details about participants' information behaviour that may have not otherwise been verbalised. To conclude the session, participants were asked tie-up questions surrounding the site in general and any information behaviour that they had displayed.

As this was intended to be a naturalistic study, participants were interviewed and observed in their place of work. This was in their private office and access to LinkSphere was provided via a laptop, participant 3 however, gained access to LinkSphere via their personal desktop computer.

The sessions were audio recorded and a screen capture tool was utilized to aid transcription and detailed analysis. The think-aloud observations were then transcribed and analysed using the 'open' and 'axial' coding elements of Glaser and Strauss's Grounded Theory in order to identify categories of information behaviour and how they relate to one another. The analysis was 'grounded' due to the findings emerged by 'listening to the data' as opposed to seeking to test existing hypotheses. This avoids bias on behalf of the observer, allowing the data to be completely user guided.

Research Findings

Out of the 27 who agreed to participate in further user evaluation, 5 agreed to participate in an observation session.

Login

Participants were given the initial task of logging into the system using their university of reading credentials, the option of a dummy account was offered if preferred. All participants' comments upon the location of the login:

"It's not in the first place you look" (OBP4)

"Looking for login...not quite where I'm expecting. I'm looking top right...somewhat confused and getting quite frustrated I know I need to login as I want to get to personal stuff. So I scroll. AH. Well immediately I don't like it there." (OBP2)

Two participants commented upon the lack of distinction between the user being actively logged in or out, both stating that they would expect to see the content change accordingly in the main section of the screen:

"I'm not getting the screen I'm expecting. I don't expect to see the same welcome screen as I've seen previously." (OBP2)

One participant directly commented upon the display of the user name rather than Christian name:
"I'd like to see my Christian name, hate having user name visible like that" (OBP2)

Recommendation: Relocate user login details to a more visible location; top right or top left above navigation.

Recommendation: Login holding page, this would also provide an opportunity to supply the user with information about LinkSphere. All the participants commented about the general function of the site
"My immediate reaction to the site, I don't know what the site does, the name LinkSphere isn't clear" (OBP5)

Navigation Bar

Participants were provided with the task to look at the left hand navigation with the specific aim of commenting upon the perceived functionality, and if it would be beneficial for them to use for work or research within the university. All participants commented upon the length of the navigation. Two participants stopped the task due to the ongoing length of the menu.

"First impression of the menu; is there is a lot of stuff in the menu. There's triangles by some of the entries and circles by the others... I'm not sure what that's meant to signify... I'm not sure what order these are in either" (OBP3)

"I'm not going to click down all these menu options" OPB5)

Recommendation: Shorten Navigation see appendix for suggestion.

For the purpose of this report the navigation has been split into comments on each of the navigation headings. The participants were not all systematic in the interaction with the site, therefore some

headings received more attention than others particularly create project, biblio, issues, my relationships and feed aggregator.

Create Content

One participant actively investigated 'Create Content' stating;
"Not sure what content is...I guess I can create anything below. There seems to be quite a lot of things I can create." (OBP 3).

Observation participant 1 verbalised overlooking create content; *"Rather than create content, see what's here"* (OBP1). The remaining participants chose not to comment.

My Unread

All participants appeared to be familiar with the term, three respondents enquired as to whether this would be linked to institutional email, observation participant specifically mentioned compatibility to Microsoft exchange.

My Account

Similar to 'My Unread' all participants seemed to be comfortable with the term, assuming that the function was to amend personal details; *"an area where I can change my name, personal details and stuff"* (OBP2).

Blogs

Blogs received a lot of attention by all the participants but there was clear confusion about the content, whether it was internal or external to the LinkSphere site and it was specifically tailored and personalized to their individual criteria. There was also confusion regarding user selection of what content appears in this section, other whether it is by topic, department, LinkSphere as a whole. This raises issues about user controls, and personalization of the system.

Forums

The concept of forums proved positive, as it would allow groups or project teams to post information and ideas in a specific environment.

Biblio

Biblio caused an issue with all of the participants. The terminology provoked all the participants to directly question the observer; *"Biblio; stands for bibliography?"* (OBP1).

This uncertainty was followed up with more queries concerning the ownership of the bibliography, was it a tool for the user's own publication, was it for LinkSphere specific publications or all users' publications. A key point was raised by three of the participants about a link to CentAUR, the central archive for the University of Reading.

"Is CentAUR going to link to that because I'm not going to do it [upload publications] twice" (OBP3).

This is a key issue that needs to be considered by the LinkSphere team, if this functionality of the LinkSphere site is to be utilized fully and beneficial to users it may be required to work with tools already being provided by the university.

"If you can link to things that already exist then it really helps." (OBP3).

There seems to be a sense of trust and belief that already existing resources within the university, as well as external resources provided by Google and Microsoft (recurring examples by all participants) are reliable and relevant for their user needs.

Recommendation: Investigate compatibility with CentAUR, to enable easy access to publications data for users.

Groups

Concerns were raised about the content of the groups tab, would it contain the groups that the individual users have expressed a specific interest in or would it contain all groups throughout the LinkSphere site. This again raises the issue of personalization. Therefore it seems appropriate to develop adaptive personalisation, which is utilised by many social networking sites, in order to represent the characteristics of the user, enabling content and layout to be adapted for different individuals.

Recommendation: Simplify groups to contain individual user interest groups.

Messages

Participants raised points concerning the content of messages; would this contain system messages or would it contain users' institutional email. If it contained system messages does it have the ability for these to be diverted to email. There was also some confusion to the distinction between 'My Unread' and 'Messages' as it was assumed it would both lead to an inbox.

Contact us

Participants believed this to be somewhat impersonal; *"Doesn't say who I'm sending it too, I would like to know who this email goes to"* (OBP1). Observation participant 4 expressed a preference for contact details to be provided as *"a email address, so I can send it from my email account"* (OBP4) rather than an inbuilt form on the LinkSphere site.

Glossary

Glossary received mixed reactions. One participant was pleased to see the glossary as part of the navigation bar; the remaining participants queried the glossary interface:

"To me this isn't a glossary. A glossary is a list of words with explanations. What are the numbers and letters for?" (OBP4).

"I thought a glossary was a definition of terms; I'm not sure what this is" (OBP3).

Create Project and My Projects

Create object proved to be of interest to the participants, however with further investigation it was found to be inadequate for the user needs. Observation participant 2 went into great detail about their preferences about what this tool should contain, specifically relating to PRINCE2 structures and processes. The concept of a project management dashboard was also discussed which would include project stages, resources used, and a status flagging system to show information about specific projects scope, timescales, resources and completeness. None of the participants chose to comment on 'My Projects', presumably because it was considered to be the same as Create project.

Participants all mentioned other external resources and application that they already use to work collaboratively and utilize in their daily work and research practices. The participants' decision to compare LinkSphere with similar external application is influenced by usability and functionality issues producing a positive experience. All the participants appear to find pre existing applications easier to use;

"I guess I would have to read a manual before I knew what I was doing on this." (OBP3)

Prior experience and familiarity with other resources is an issue that LinkSphere will have to address to ensure users are comfortable with the available functionality.

Recommendations: Merge create project and My projects together under a new 'Project' tab. Enabling users to view their own personal involvement in projects as well as providing basic information about other projects in the LinkSphere system. Utilise a project management dashboard for clean design and functionality.

Issues

This raised several comments about the ability to view software development issues; users believed this should be internalised and only viewable by the development team. *"I'd expect to see that on a software development site, don't expect to see that on a social network"* (OBP3).

My Relationships

All the participants commented upon the community aspect of the site. Observation participant 1 considered a community building tool to be much needed at the University of Reading. All the participants approved of the concept behind My Relationships. The participants also mentioned LinkedIn as their current means of connecting to colleagues. It is therefore a useful suggestion for the LinkSphere site to utilize LinkedIn functionality in a University wide system. All the participants believed it would be useful to be able to connect to colleagues.

"It is useful if it focuses on things specific to Reading campus like finding colleagues and things like that...It would be really useful to find people at the university who are doing similar things... based on comment interests... or skills." (OBP3)

My Relationships also provoked responses about privacy, all participants querying if being in a relationship with another users, releases more content to that specific user.

"What happens if I just want [my department] to see my content?" (OPB1)

This corresponds to previous raised ideas about trust and reliability in pre existing external resources. If users have had a previous positive experience with another social networking or collaborative working site, the user will perceive that LinkSphere should have the same privacy functions. All the participants mentioned LinkedIn and Facebook as having beneficial networking opportunities in a safe and trusted environment. Observation participant 3 specifically discussed a research based social networking site; SciSpace.com, a site for science researchers for sharing and collaborative which has access control.

"It's a similar social networking thing for scientists...basically I've got friends on this, I can join communities of interest, individuals can have blogs and communities can have blogs...It has fine grained security, so you only have to reveal things to your colleagues, so there is a whole load of stuff on here that I can't see, people who use it to collaborative on writing papers that sort of thing...It's got in to the top 100 sites for professionals" (OBP3)

Recommendation: Develop fine grained security settings to create a trustworthy and private environment to encourage collaborative working. Investigate suggested external resources which users already use regularly to work collaboratively and to network with colleagues as part of their work and research practices.

User List

One participant did not want to be able to view all the users, as it was not imperative for her work or research. None of the remaining participants expressed an opinion on this concept.

Recommendation: User list as a search directory, allowing users to search for colleagues according to common interest, similar projects, department, and skill set etc.

Feed Aggregator

None of the participants could ascertain where there feeds in this field were originating from, or what the content criteria were;

"No idea, it a feed from where?" (OBP4)

"Can I add my own personal feeds to this?" (OBP3)

"Is a personal feed aggregator within LinkSphere something you are likely to utilise?" (Observer)

"Well to be honest I use Google Reader and various other things... I guess if this was a site I was going to spend a lot of time on its quite handy to have feeds in there, but I'm not going to use it [the LinkSphere site] because of that" OBP4)

All the participants commented upon their individual aggregating services which they already used; igoogole, chrome, and Google reader.

Other Comments

Web accessibility conformance was raised straight away by Observation Participant 1. Participant 1 was unable to read the text adequately due to blue text on a blue background. The number of words on a line of text was also raised as a concern.

Recommendation: Ensure conformance with W3C web accessibility initiative.

Conclusion

This research focused on observing academics information behaviour and website interactions in as naturalistic way to gather user requirements and initial user reactions to the LinkSphere site. 6 main issues were discovered and a series of recommendations have been made.

◆ **Community, Finding Colleagues and Networking**

Community is a key concept that all of the participants commented upon. All the participants believed community building, finding colleagues and networking to be beneficial to their working practices.

◆ **Trust**

There is a sense of trust and belief that already existing resources within the university, as well as external resources provided by Google and Microsoft (recurring examples by all participants) are reliable and relevant for their user needs. The participants all mentioned Privacy as an issue. The development of fine grained security settings to create a trustworthy and private environment will encourage collaborative working.

◆ **Personalization**

Respond to the different needs and characteristics of users. Develop adaptive personalisation, which is utilised by many social networking sites, in order to represent the characteristics of the user, enabling content and layout to be adapted for different individuals.

◆ **Simplified Navigation**

All participants commented upon the length of the navigation, finding the number of options daunting. All respondents found other external resources easier to use and made direct comparisons to the LinkSphere site.

◆ **Pre Existing Resources and Positive Experience**

The participants' decision to compare LinkSphere with similar external application is influenced by usability and functionality issues producing a positive experience. All the participants appear to find pre existing applications easier to use. Prior experience and familiarity with other resources is an issue that LinkSphere will have to address to ensure users are comfortable with the available functionality.

◆ **Project Management Dashboard tools and Collaborative Working**

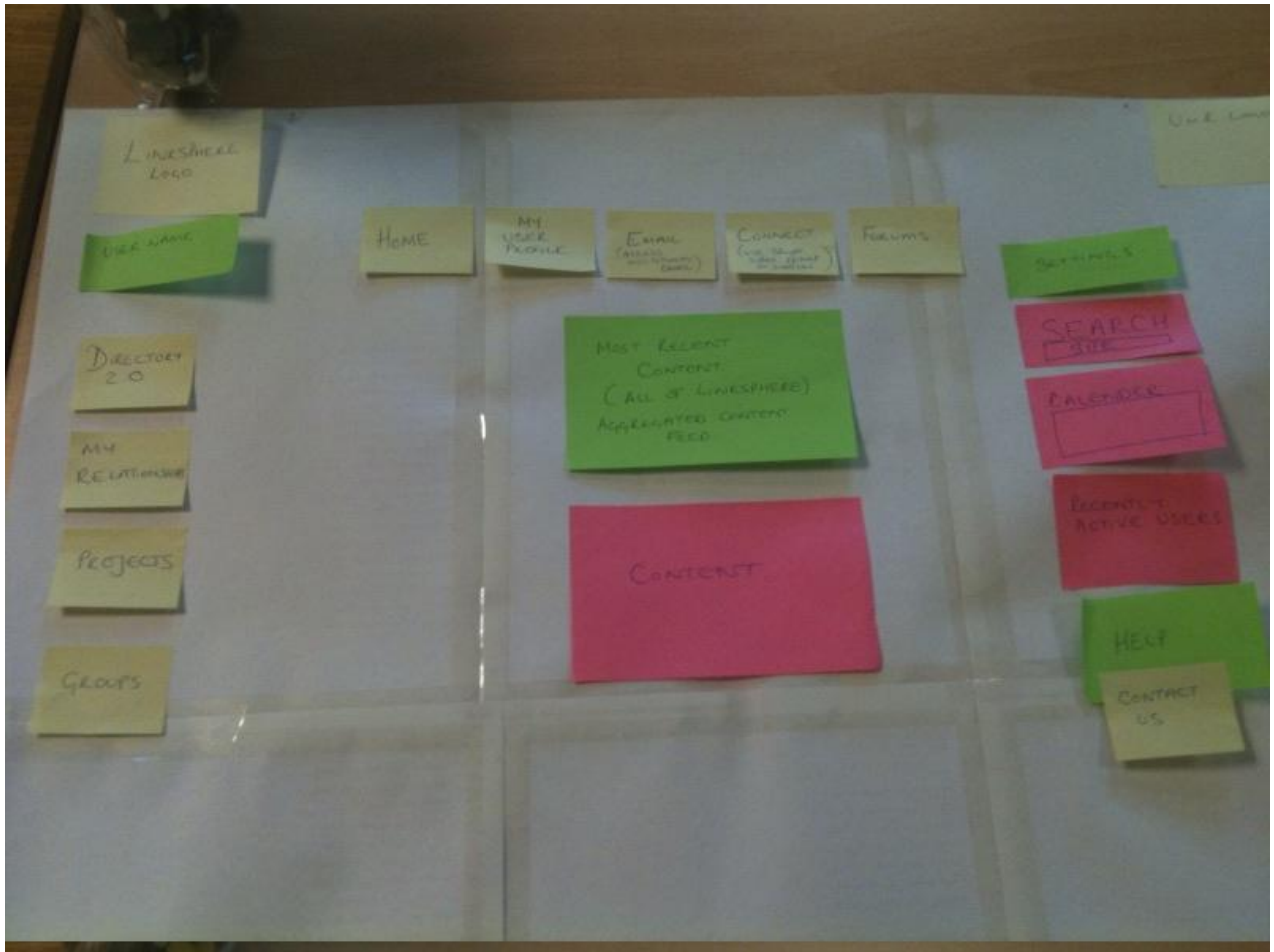
Participants all mentioned other external resources and application that they already use to work collaboratively and utilize in their daily work and research practices. It is worthwhile investigating suggested external resources which users already use regularly to work collaboratively and to network with colleagues as part of their work and research practices. The concept of a project management dashboard was also discussed which would include project stages, resources used, and a status flagging system to show information about specific projects scope, timescales, resources and completeness, this will enable the 'Projects' functionality to meet the users requirements.

Appendix

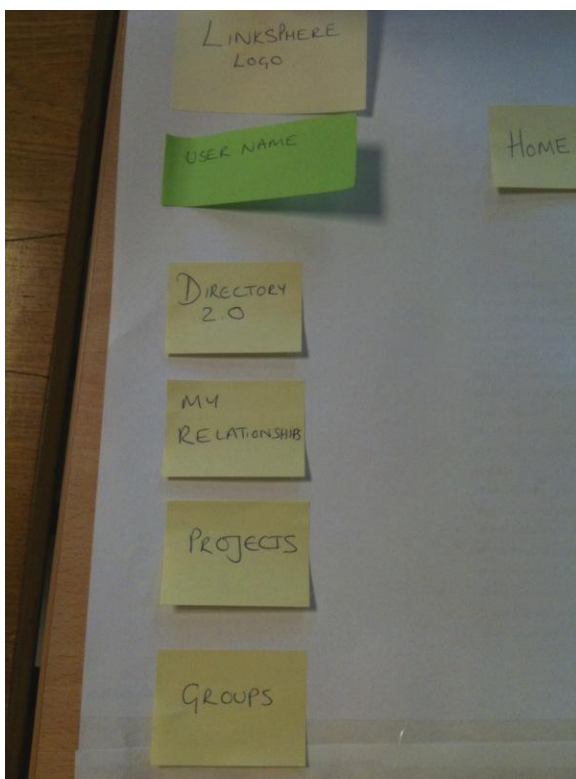
Proposal: LinkSphere as a Directory 2.0

Allow users to upload individual biographies, provide collaborative space for project and group discussion, enable finding colleagues and networking within the university simple and easy. Incorporate directory searches based on name, department, projects, specific skills set, and research interests. Utilise tagging to enhance accurate searching.

Provide facilities for creating connected relationships and collaboration within the LinkSphere directory via forums, group discussion spaces and project management dashboard. Incorporate individual and group blogging as personal note spaces.

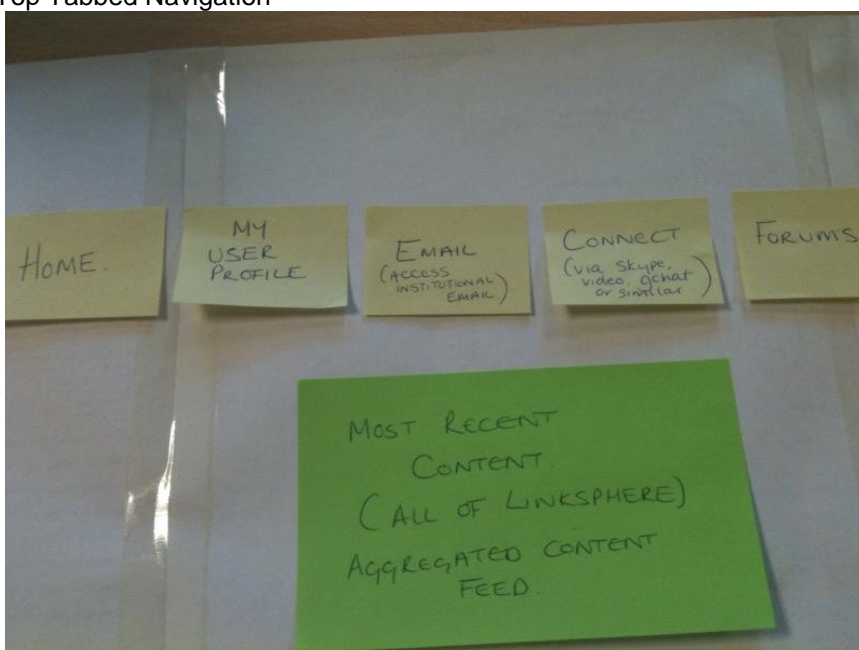


Images show a suggested simplified clean layout.



Left Hand Navigation

Top Tabbed Navigation



Right Hand Navigation

Appendix 7: LinkSphere: Prioritising Design Concept Requirements

Summary

Prioritizing the requirements - The requirements from the user testing (interviews, observations and paper prototyping) has become very large, making it quite impractical. Prioritizing the requirements has been necessary, to create a definitive user requirement list. Therefore the UCL usability team have refined the user requirements into key design concepts - funnelling down the SN capability into a more manageable and user friendly concept. This involved creating two design concepts or themes, and exploring which themes and generalised interface design concepts users preferred.

Paper Prototyping

Document title: LinkSphere Final Report
Last updated : Sept 2011

The primary goal of prototyping within user-centric design is to have a way to help users test and share opinions about the design concepts. Paper prototyping is a rapid prototyping technique with the aim of gathering insights about how users respond to concepts and or designs. The whole point of doing paper prototyping is being able to do this quickly since they are going to change in the next phase of work.

Screen drawings by users were created using labeled post it notes by users, this activity allows test participants to express themselves better. By allowing them to modify anything or redraw/add/ remove certain elements. The post-its can be easily moved around or grouped at a later stage. This provides a clearer picture of how users imagine the site or a certain element working. 6 Academic researchers and lecturers were recruited, representing different disciplines within the university. The data collection and analysis approach focused on observing participants decisions and interactions whilst creating the paper prototypes. Each participant undertook the task on their own and were observed one on one. This approach follows on from an initial user requirements survey and user observations, which formed part of the gathering user experience phase; providing the project team with an understanding of LinkSphere's potential users, their motivations, environment and experience.

Analysis of the paper prototypes produced a key issue concerning design:

All respondents produced paper prototypes which followed the same design; Left hand navigation as well as top level navigation. Each respondent also referred to Facebook as the layout they were using as a basis in their design. All the participants conformed to the broad definition of social network sites as services that allow individuals to:

construct a public or semi-public user profile within a system

articulate a list of other users with whom they share a connection

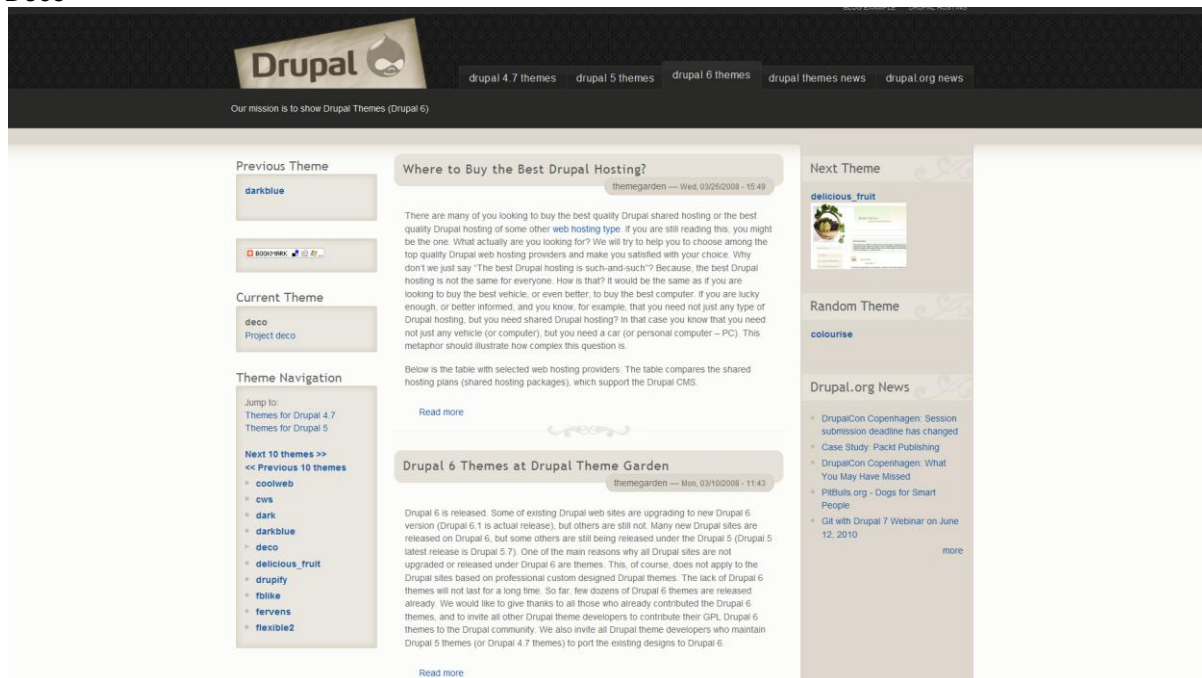
view and traverse their list of connections and those made by others within the system

by including 'my profile/my account', and 'my contacts' in their paper prototypes. Therefore these three elements need to be emphasised within the LinkSphere site.

Prioritising the Requirements and Refining Concepts

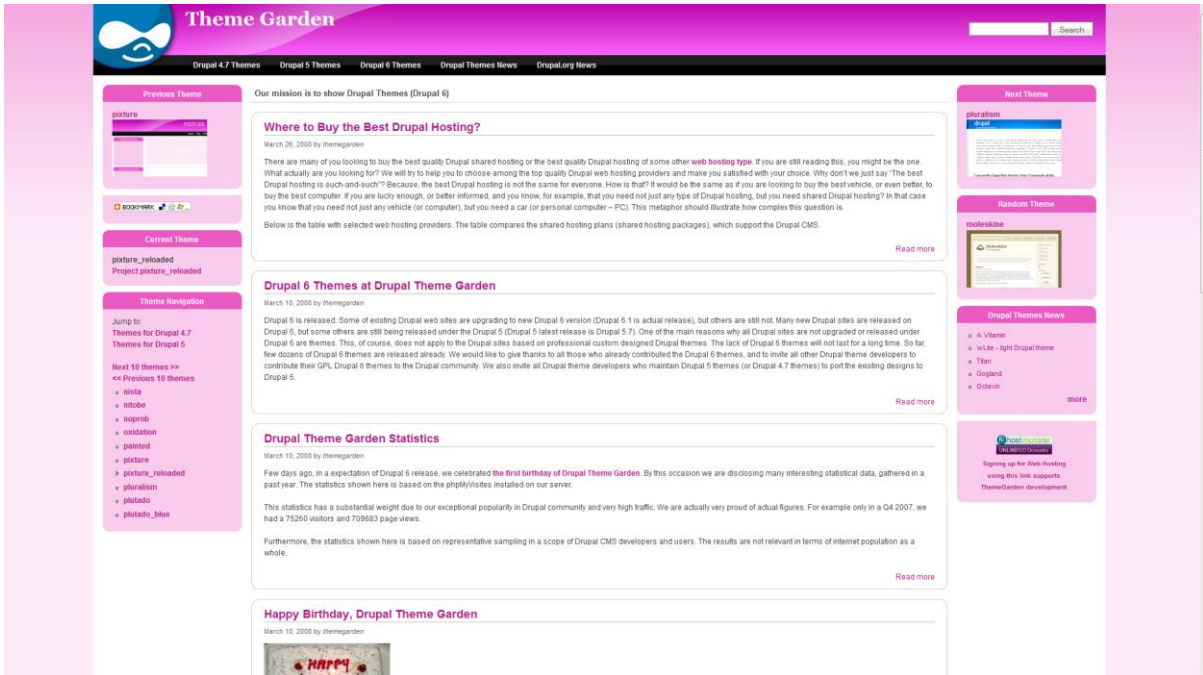
Following on from these user results an investigation into Drupal themes was undertaken. From all the themes, 30 were selected which matched the criteria suggested by the users during the paper prototyping stage. This was then narrowed down further by the UCL usability team to two key design concepts:

Deco



<http://themegarden.org/drupal6/?q=node&theme=deco>

Pixture_reloaded



http://themegarden.org/drupal6/?q=node&theme=picture_reloaded

Refining Concepts Survey

The online survey was designed to gather data specifically on design concepts and user assumptions. The survey was sent to all previous participants in observation and paper prototyping sessions. The survey was divided into 7 questions, comprised multiple choice, in order to quickly gain insights into the individual user attitudes towards different interface designs.

To date 9 survey responses have been collected.

Results

User Demographics

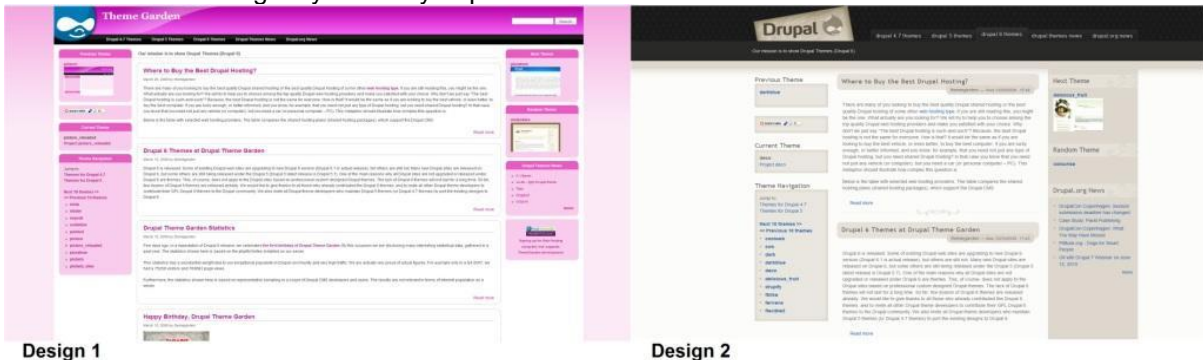
Gender

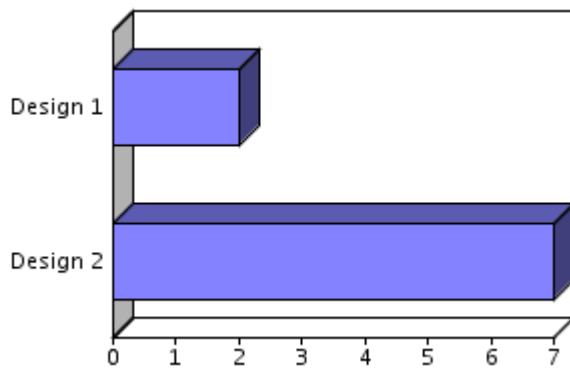
Option	Count	Percent	Cum. count	Cum. percent	Cum. sum
1. Male	5	55.56%	5	55.56%	5
2. Female	4	44.44%	9	100.0%	13
Total	9	100%	9	100%	13

Age

Option	Count	Percent	Cum. count	Cum. percent	Cum. sum
2. 21-30	4	44.44%	4	44.44%	8
3. 31-40	2	22.22%	6	66.67%	14
5. 51-60	3	33.33%	9	100.0%	29
Total	9	100%	9	100%	29

Which of the two design layouts do you prefer?





Option	Count	Percent	Cum. count	Cum. percent	Cum. sum
1. Design 1 (pixture_reloaded)	2	22.22%	2	22.22%	2
2. Design 2 (deco)	7	77.78%	9	100.0%	16
Total	9	100%	9	100%	16

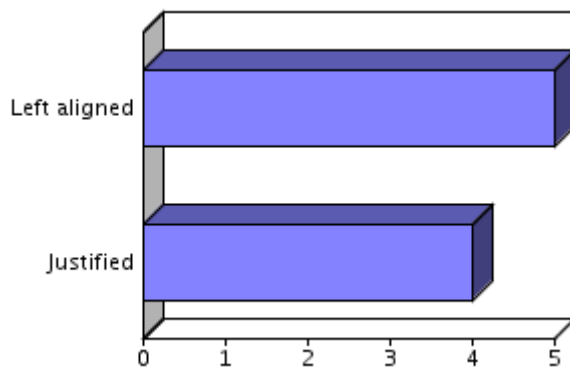
Which block of text is easier to read?

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce sollicitudin magna vel mauris viverra sodales. Donec tincidunt condimentum mattis. Cras pretium ante a neque blandit a tristique risus ultricies. Sed egestas, mi vitae feugiat tempor, diam odio posuere nisl, lacinia mattis quam dui quis eros. Cras eu orci accumsan tortor luctus feugiat. Curabitur sagittis neque quis lectus mattis vitae tincidunt arcu pretium. Praesent ipsum lorem, ornare eu commodo at, mattis non lorem. Sed posuere convallis libero at pharetra. In hac habitasse platea dictumst. Curabitur eget vehicula nisi. Integer congue posuere massa, vitae ullamcorper massa convallis ut.

Left Aligned

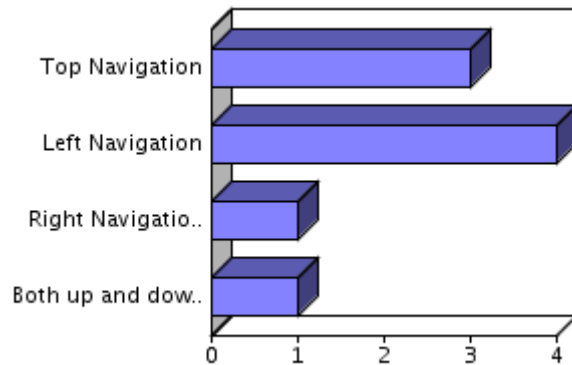
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Justified



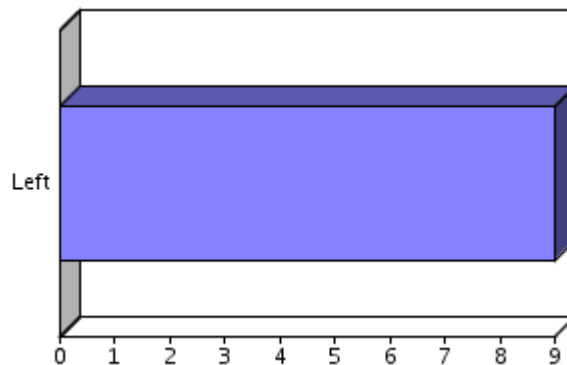
Option	Count	Percent	Cum. count	Cum. percent	Cum. sum
Left aligned	5	55.56%	5	55.56%	5
Justified	4	44.44%	9	100.00%	9

1. Left aligned	5	55.56%	5	55.56%	5
2. Justified	4	44.44%	9	100.0%	13
Total	9	100%	9	100%	13



Where do you prefer to find navigation menus?

Option	Count	Percent	Cum. count	Cum. percent	Cum. sum
1. Top Navigation	3	33.33%	3	33.33%	3
2. Left Navigation	4	44.44%	7	77.78%	11
3. Right Navigation	1	11.11%	8	88.89%	14
4. Both up and down	1	11.11%	9	100.0%	18
Total	9	100%	9	100%	18



Where would you prefer to see a project logo?

Option	Count	Percent	Cum. count	Cum. percent	Cum. sum
1. Left	9	100.0%	9	100.0%	9
Total	9	100%	9	100%	9

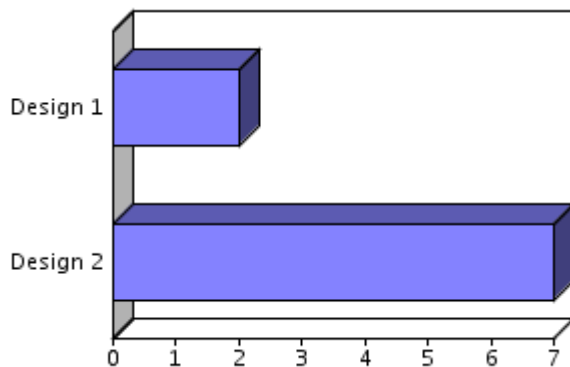
Which design would encourage you to trust the site content?



Design 1



Design 2



Option	Count	Percent	Cum. count	Cum. percent	Cum. sum
1. Design 1	2	22.22%	2	22.22%	2
2. Design 2	7	77.78%	9	100.0%	16
Total	9	100%	9	100%	16

Recommendations

Concept iteration - A final design plan for development in real time for user testing. Elaborate on a single concept and developing the interactions more in detail and then testing this with users. This final design should include:

- Implementing the Deco Drupal theme
- Top and Left hand navigation to be fully utilised
- Left aligned text

A project logo/name to be clearly inserted in the top left of the design interface

Appendix 8: Initial modules used in Social Networking prototype

Access/Authentication

- Webserver authentication
 - Rely on the web server authentication instead of Drupal.
- Content Access
 - Provides flexible content access control
- User
 - Manages the user registration and login system.

Blogs/site content

-Blog

Enables keeping easily and regularly updated user web pages or blogs.

-Book

Allows users to structure site pages in a hierarchy or outline.

-Forum

Enables threaded discussions about general topics.

-Wikitools

Provides helper functionality to have wiki-like behaviour.

-Upload

Allows users to upload and attach files to content.

-Creative Commons Lite

Allow User to add Creative Commons Licenses for selected content type.

Communication

-Comment

Allows users to comment on and discuss published content.

-Comment upload

Enables file attachments on comments

-Notifications

The basic notifications framework

-Taxonomy Notifications

Allows users to subscribe to taxonomy terms.

-Private messages

Allow private messages between users.

-Chat Room

Enables the creation of rooms that provide access to chats and chat archives.

-Content Notifications

Allows users to subscribe to content related events.

-Organic Groups Notifications

Allows users to receive notifications and subscribe to group content.

-Privatemsg filter

Allow users to filter messages using tags or other criteria.

Social

-Organic groups access control

Enable access control for private posts and private groups.

-Profile

Supports configurable user profiles.

-RealName

Use user profile fields to build a 'realname' field in a user object.

-Twitter

Adds integration with the Twitter microblogging service.

-User List

Provides various user list views as pages and blocks.

-Avatar Selection

Manages configuration of a default list of avatar icons that a user can use instead of uploading a picture.

-Organic groups

Enable users to create and manage groups. OG Views integration module is recommended for best experience.

-Taxonomy

Enables the categorization of content.

Tools

- Biblio
Maintains bibliographic lists.
- Project issue tracking
Provides issue tracking for the project.module.
- Poll
Allows your site to capture votes on different topics in the form of multiple choice questions.
- Project
Provides a project node type and browsing of projects.
- Project releases
Provides a release node type to represent releases of projects.
- Search
Enables site-wide keyword searching.

Enhancements

- Aggregator
Aggregates syndicated content (RSS, RDF, and Atom feeds).
- Cumulus
Provides a Flash-based 3D tag cloud.
- Faceted Search
API for performing faceted searches.
- Path
Allows users to rename URLs.
- Tagadelic
Tagadelic makes weighted tag clouds from your taxonomy terms.
- Faceted Search UI
User interface for searching and browsing through multiple facets.
- Browsing History Recommender
Recommend nodes based on users browsing history.
- Recommender API
Generic purpose recommender system algorithms
- Wysiwyg
Allows users to edit contents with client-side editors.

System and services

- Field Indexer
Provides a configuration page and an API for indexing fields into the search index.
- Rules Forms support
Provides events, conditions and actions for rule-based form customization.
- Search Service
Provides a search service.
- SMTP Authentication Support
Allows the sending of site e-mail through an SMTP server of your choice.
- Throttle
Handles the auto-throttling mechanism, to control site congestion.
- UR-API
API for User Relationships. This will only provide the programmer interface.
- User Service
Provides a user service.
- Views UI
Administrative interface to views. Without this module, you cannot create or edit your views.
- Advanced help
Allow advanced help and documentation.
- Block
Controls the boxes that are displayed around the main content.
- Blog API

Allows users to post content using applications that support XML-RPC blog APIs.

- Messaging

Messaging system. This is the base module for the Messaging Framework

- Comment Service

Provides a comment service.

- Contact

Enables the use of both personal and site-wide contact forms.

- Node Service

Provides a node service.

- Rules Administration UI

Provides the administration UI for rules.

- Services

 - Provide an API for creating web services.

- System Service

 - Provides system services.

- Trigger

 - Enables actions to be fired on certain system events, such as when new content is created.

- Update status

 - Checks the status of available updates for Drupal and your installed modules and themes.

- UR-Node Access

 - Provides per node access control based on relationship to author

- UR-UI

 - User Relationships UI. This enables basic UI functionality for User Relationships

- Views

 - Create customized lists and queries from your database.

- Drush

 - Facilitates maintenance tasks

Reporting

- Database logging

Logs and records system events to the database.

- Statistics

 - Logs access statistics for your site.