RIGHTS & REWARDS

In Blended
Institutional Repositories

The Rights and Rewards project: teaching resource repository infrastructure

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1.0 Introduction

The sharing of resources for use in teaching and learning within higher education institutions is one of the issues that the Rights and Rewards projects seeks to address. Through survey and interviews the project has identified a willingness, on the part of academics and other staff groups, to engage in activities that result in greater exposure of their teaching resources and expertise. The mechanism that the project proposes to put in place to facilitate sharing across the sector is an institutional repository. This teaching resource repository will be established as a demonstrator, which will be available until the completion of the project.

After gathering user requirements and investigating possible single system solutions, it was agreed that adopting a 'repository service' approach that integrates a number of systems would be most suitable for this project. This method has a number of benefits in terms of: service provision, system infrastructure, architecture, and sustainability. It will enable content and information to be harvested from other services. As with many other institutions, these services are delivered, maintained, and supported centrally.

Although the demonstrator service is only intended as a 'proof of concept', the project does aim to report on future technical developments in the repository field. With this in mind, a flexible approach to repository provision, with a view to possible future developments and enhancements to such services has been taken. A distributed system approach ensures that tools developed in the future can be included in a repository service. Developments in the repository field can also be monitored and easily incorporated without disruption to the whole service. This helps to ensure that services are sustainable in the long-term.

The report details the project's solution to the provision of a demonstrator teaching and learning repository at Loughborough University. However, the implementation of a similar distributed system could easily be achieved within other institutions as standard technologies have been adopted. A later report will document the final technical architecture, what standards could readily be adopted, and which ones proved more problematic.

2.0 Background

Institutional Repositories (IRs) are being set up in a number of UK Higher Education Institutions (HEIs). The majority of these house the research outputs of the institution. The Rights and Rewards project is establishing a demonstrator repository for teaching resources. One of our aims is to see how this repository can 'blend' with the institutions existing research repository, which uses DSpace to deliver its service. We also plan to link other central services provided by the institution to support research and teaching practices.

The literature on teaching output repositories offers some cautionary information in relation to the barriers associated with setting up, populating, maintaining, and sustaining a service that will satisfy the needs of resource contributors, institutional managers, and end users. There are particular requirements associated with teaching resources that relate to file formats, granularity of objects, access controls, interactivity, and supporting the reuse of items. In a study of the provision of a shared repository for use by Scottish staff developers, Campbell, Littlejohn and Duncan (2001, 33) reported that this group were interested in having access to resources created by the community. However, they were less willing to submit their own items to a shared resource base. Reasons cited for this reluctance to share were:

- o Loss of copyright and intellectual property rights
- o Financial factors
    - o potential for loss of profit making activities resulting from wider exposure of their own materials
    - o others might be able to generate profit by reuse of their items
- o reciprocity – principle of give resources in order to receive from others

(Campbell, Littlejohn & Duncan 2001, 33-34).

The final report from the JISC funded X4L programme also highlighted a range of concerns around institutional repositories. These issues were identified at focus groups and interviews with institutions that have a repository, and with those that do not currently have a repository service. Their findings are summarised below:

Concerns of institutions with a repository
- o difficulty populating – time consuming advocacy
- o patchy subject coverage
- o sustainability and buy-in from senior managers
- o open source – sustainability and responding to requirements for new features
- o software does not provide the range of features required by users
- o flexible access to repository content via interfaces that allow for subject groupings or communities of practice

Concerns of institutions without a repository
- o cost
- o sustainability
- o how to populate
- o quality of the metadata
- o value of the repository – must be driven by the needs of institutions and the user community
- o useful for internal sharing but there is a question as to the value of wider sharing
- o Intellectual Property Rights and copyright concerns

(Heery & Anderson, 2005, 24-25).

For a culture of sharing and reuse of teaching resources to flourish, Baldwin (2004, 16) has identified areas where change within institutions is required. In the first instance teachers must be willing to share their materials. For repurposing to become mainstream, it needs to be embedded into institutions and be built into their educational strategies. The main barriers to change identified by Baldwin (2004, 17) are "time, skills, and institutional attitudes".

Heery and Powell have created a repository roadmap which details a vision for 2010. In this they note that "academic staff traditionally like to control the use of their teaching materials and submitting them to any kind of repository raises all kinds of issues regarding ownership, copyright, quality control, sharing, reciprocity, etc." (Heery & Powell 2006, 15).

It is against this backdrop of cautious approaches to repositories that the Rights and Rewards project embarks on the testing of ideas and principles rather that delivering a production level implementation of a repository service. We are developing a demonstrator repository with a level of functionality that will ensure an adequate understanding of the service and facilitate suggestions for possible future enhancements, should institutions wish to implement a similar service. Repository services will be accessed via a web-based interface, PEDESTAL - Platform for Exchange of Documents and Expertise Showcasing Teaching At

Loughborough. Loughborough university employees will be able to login for access to a range of personal resource management features. They will be able to upload their teaching resources, and maintain a weblog to share commentary on their resources as well as writing about interesting developments in the field of teaching.

3.0 User requirements

3.1 Current practice for sharing teaching resources

Academics currently share different resources with different groups via a range of mechanisms available to them. Resources are provided for student access through the university's Virtual Learning Environment (VLE). We have seen evidence of the practice of sharing on an informal ad-hoc opportunistic basis between lecturers in the same department. A degree of sharing within institutional boundaries also occurs (Loddington *et al.*, 2006). However, there are no formal centrally managed systems for lecturers and other staff groups to share teaching resources within the institution, or with a wider audience.

The project's motivational study made use of a survey instrument to gather information on the current practice of sharing teaching materials via repositories. It also questioned respondents about their views on the practice of sharing these resources and what barriers there are to sharing and conversely what incentives would they like to see in place to encourage wider sharing of resources (Bates *et al.*, 2006).

Table 1 lists project activities and findings based on user requirements for a teaching resource repository service. It illustrates the diverse views of the user group and highlights a range of requirements that are driven by people and delivered by systems.

Activity	Findings
Academic survey	- Views on suitable content for a teaching resource repository varied. Some Individuals thought that only "good quality" material should be accepted. Others wanted to be able to contribute all the items they produced to support their teaching. - Contributors wanted to vary access to their materials depending on the item type and the category of user accessing the resource. - Resource creators expressed interest in having feedback on their items. This might provide valuable information on how the item has been amended and reused in teaching. This feedback could be used to improve teaching materials.
Digital lifecycles study	- Due to the varied nature of teaching materials it was concluded that some media may be better suited to storage in a separate repository. For example, instead of having a general teaching resource repository, there could be a number of specialist ones (especially for images, large sound or movie files). Individuals could then search across these repositories for the material they need.

Workflow exercise	- There may be a need for the provision of systems that support formal and informal sharing. Formal sharing may be more suitable for items that have some form of quality assurance - published papers reporting on teaching methods or projects, resources reviewed as part of the teaching or teaching award process. Informal sharing may be more suited to sharing within institutional boundaries – examples of teaching resources, raw objects that can be incorporated into teaching, and internal discussions on a broad range of teaching issues. - Teaching material may be subject to constant alteration and improvement. These amendments are sometimes minor, but substantive changes can also be made. This practice reflects the need to ensure: the accuracy of content, to bring teaching materials up-to-date, and to introduce new courseware.

Table 1: User requirements for a teaching resource repository

The project aims to align technology and current practice to deliver a system appropriate for the needs of end-user groups. Heery and Anderson (2005, 15) point out that meeting the needs of users is key to guaranteeing a repository's success. They also stress the need to engage the user community in the development process (Heery & Anderson 2005, 15). We have undertaken a user needs analysis, via survey, interviews and a poll, to gather service requirements. The demonstrator will be tested by pilot groups, drawn from the user community, who will return valuable feedback on usability, feature requirements and future development.

4.0 Functional requirements

The essential elements of a teaching resource repository service that our research has identified are:
1. Files should be easy to upload; the creator / depositor of the material has to confirm their legal right to deposit the item(s)
2. Resources can be tagged with metadata to describe them for the wider audience
3. Access to objects can be restricted to specific categories of users, i.e., internal and external.
4. Permitted users should find it easy to locate and access objects
5. Comments to items should be permissible
6. The repository can interoperate with existing systems, preferably by standards

4.1 Licences support

Heery and Powell (2006, 14) note that "the licensing of learning materials will be protective of the rights of authors, institutions and third-parties but supportive of an open access approach". A range of licences need to be provided in order to "ensure that a) the university has the rights it needs to offer the repository service; b) the depositor retains the rights (moral and property) they [can reasonably] demand; and c) the users have the access rights they need to make use of the materials"[1]. A depositor-repository will be provided to satisfy the requirements for sharing within the institution and with an external audience. For internal sharing repository–end user terms and conditions will be available. For public sharing, repository–end user, Creative Commons licences will be available. The licence selected cover: Attribution, Non-commercial, and Share alike.

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[1] Gadd, E. *A teaching and research material repository service at Loughborough University*. 2006. Unpublished report for Loughborough University's Learning and Teaching Committee.

4.2 Access management

Authentication to the service for resource contributors is via the university's username and password system. This allows for a more streamlined approach to the provision of access. It also eliminates the need for an additional password system, and importantly individuals are not forced to remember a separate username and password in order to gain access to the service.

4.3 Comments facility

A facility to allow authors to describe their resources, and for others to provide feedback, has been highlighted as a potentially useful addition to a repository service for teaching resources. Survey respondents indicated that this would be useful for illustrating examples of resource reuse and ultimately to improve resource quality. Heery and Anderson (2005, 19) note that "The W3C proposes that annotations are treated as metadata and a list of annotation tools is given at http://annotation.semanticweb.org/annotation/tools".

4.4 Existing systems

The repository service will interact with the university's existing research repository, an imagebank, publications database, and the VLE. RSS feeds will provide a solution to the problem of informing users of both internal and external content, news and resource updates.

5.0 System requirements

Requirements for the demonstrator system have been derived from the functional requirements. System requirements are outlined below:
- be sustainable – low maintenance
- not include too many people in the workflow
- be easy to use
- be designed around the way people work
- create good working methods
- support open access and restricted access
- Provide search and browse options for content location
- Allow federated searching – e.g., via the Google Mini search appliance
- Make use of Open Source products where possible
- Have an extensible architecture
- Support RSS – with internal aggregator
- Deliver services via a web-based interface
- Offer automation of content where feasible – pull content into PEDESTAL and push resources and alerts out to users

Interoperability with existing systems and future services and enhancements is an important consideration for any repository service. Therefore, we intend to ensure a best efforts approach to PEDESTAL's support for the following standards: XML, RSS, OAI-PMH and LDAP / Shibboleth. It may be necessary to adopt a phased approach to the compliance time table depending upon the success of the initial launch of the service and its continued support within the institution.

6.0 Deciding what system to use

A range of possible software solutions were considered, including: well known repository software, virtual learning environments, and social software. Some of the solutions we looked at are described in the next section.

6.1 Repository software

- DSpace – is a content driven repository system, with content arranged around faculties and departments. Access can not be restricted to categories of use, and at this time it also lacks a comments or rating system. It has become apparent that DSpace alone will not support the teaching material repository 'service' solution we aim to deliver.
- EPrints 2 – does not support a range of access restrictions and does not have a comments system.
- Fedora – was not considered at this stage as it is a back-end repository system. No user interface is supplied within the installation.

6.2 Virtual learning systems

- VLE systems
  - ATutor – provides good support for sharing resources, but restricting access to resources is not flexible
  - Moodle – easy to embed into this institution, LDAP and Shiboleth authentication are supported

Issues with Moodle and other VLE systems:

1. They lack comments or ratings systems at the moment but they may be developed in the future.
2. OAI-PMH compliance is not a requirement for a VLE system. Therefore, harvesting metadata may be difficult. The most useful part of OAI-PMH is the XML file. It is technically possible to write a script to generate an XML file with all the data in it. An intermediary, like Zebra - open source Z39.50 server, could then be used for federated search of the Moodle and DSpace XML files.
3. VLEs are structured around institutions and courses, they may not be as useful for generic resources such as study skills.

6.3 Social software systems

One social software system investigated by the project was eLGG. It allows users to create informal networks and communities with other users, as well as supporting the creation of formal groups. Materials are shared across these informal and formal groupings, alternatively resources can be made freely available. In short eLGG creates networks of people around their own content; this content may be digital courseware, case studies or teaching expertise. Importantly social software affords individuals the opportunity to become part of a community with the same interests.

The primary benefits of using a social system like eLGG are:

- Individuals have the ability to share learning resources through the creation of their own communities (both formal and ad-hoc)
- Individuals can exert a variety of access controls over their resources making them accessible to either public, registered, or selected users
- Within eLGG, each user has a profile page outlining their general and specific teaching interests
- eLGG is a plug in to Moodle, a VLE system used by many HE institutions

This research suggested that additional technologies and tools would be of interest to the community. A range of tools and software were also considered

with a view to utilising them within the PEDESTAL repository service. These included:

- WebDAV - web-based Distributed Authoring and Versioning. Teaching materials are frequently changing and this technology encourages effective version control. It gives people the opportunity to share materials for comment, and to easily gather this feedback from others. http://www.webdav.org/projects/
- Peer-to-peer software – for example, share content with other LionShare users across academic networks http://lionshare.its.psu.edu/
- Flickr – a popular web based image sharing service http://www.flickr.com/
- BubbleShare – a web based service in beta production for sharing digital photos and accompanying text http://www.bubbleshare.com/
- Gallery – an open source system for organising web-based photo albums, requires installation to a server http://gallery.menalto.com/
- Connotea – save, organise, tag and share links to references with this web-based application http://www.connotea.org
- CiteULike – store, organise and share links to academic papers available on the web. Citation details are automatically extracted and your library can be exported to BibTeX or Endnote http://www.citeulike.org/
- Annotea - an annotation tool for adding annotations and bookmarks to web documents http://www.w3.org/2001/Annotea/

Some of these tools focus upon social networks rather than a systematic approach to sharing teaching and learning content and ideas.

6.3.1 Potential benefits derived from using these systems
- Driven by the requirements of practitioners and community of users
- Support grassroots activities – social networking
- Can respond to developments quickly to provide new features for the community

6.3.2 Potential drawbacks to their use
- No control over service developments – updates, patches, and features
- Cost in terms of upgrades, support and training
- No control over the actions of other users of the service – the appropriateness of the content in an academic context, and the quality of items within the service

7.0 Proposed solution

We have adopted a service based approach to bring together a range of systems at the institution. These services include: the institutions Research Repository, VLE, Loughborough Online Reading List System (LORLS), Publications Database, Teaching Resource Repository, and an Imagebank. Searching across these separate stores will be made possible by the purchase of Google Mini Search Appliance. We intend to use Google Mini search appliance to carry out federated searches over the network of institutional servers.

Within PEDESTAL service we aim to provide:

- A profile page for each individual – this will pull in details from the Publications Database, Institutional Repository, taught modules from the VLE, LORLS, and so on. There will also be a section for individuals to input their own text, describing their teaching interests perhaps

- A personal weblog for recording thoughts on teaching, events of interest, comments on resources, and other areas of interest
- A file uploader / manager to the repository
- Facilities for browsing and searching for resources (files, blog postings and individuals)
- The ability to create communities – around staff roles or shared interests
- RSS feeds for alerting individuals to content and news items from external sources. For example, the HEA Subject Centres provide a number of subject specific news and events feeds. In the future the University Library may be able to supply feeds for new books to the Library
- Spotlight feature – saved searches and tags

Figure 1 below is a screen shot of the project's development installation of PEDESTAL. It illustrates some of the features within the service.
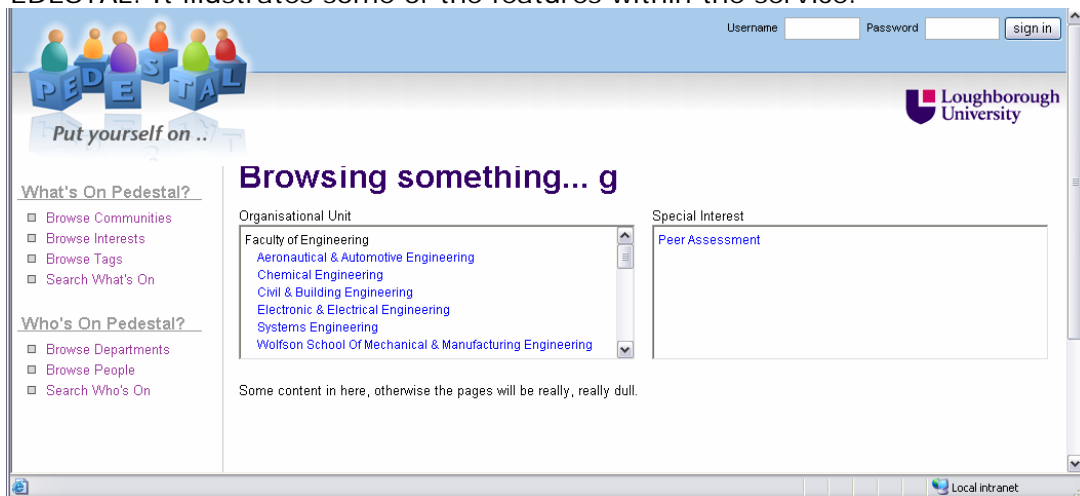

Figure 1: PEDESTAL demonstrator site

7.1 Resource tags

Sophisticated metadata vocabularies are needed for describing teaching resources. As Currier, Campbell & Beetham state "pedagogical vocabularies can help teachers and learning technologists to reflect on their practice and discuss it in coherent terms" (2005, 6). They add that being able to describe resources in this way will enable sharing and reuse of resources across disciplines and the sector. However, there may be some merit in allowing contributors to add their own keywords to their files and blog postings. The organisation of information through user-generated tags, or folksonomies as they has come to be known, would develop from the shared expertise and needs of the users of PEDESTAL.

The approach of allowing contributors to tag their own resources could prove problematic. The words individuals chose to tag items with may be textually the same but semantically different. For example, the word '*network*' could refer to '*social networks*', '*data networks*' or '*electronic networks*'. This uncontrolled use of synonyms could be channelled by utilising tags around special interest groups, top level subject headings from the Library of Congress or the Dewey Decimal System. This would provide a controlled vocabulary of broad categories to which contributors could add their own additional tags.

Shirky (2005) disagrees with the idea of combining defined structures and social tagging systems. He believes that folksonomies are powerful because they are derived from the shared experience of practitioners. He does stress that a requirement for the success of this approach is in achieving a critical mass of

individuals tagging their resources. This is by no means guaranteed and it remains to be seen whether PEDESTAL can achieve this mass of users actively tagging their own items.

One way to encourage and facilitating the addition of keywords to items uploaded to the repository might be by providing some broad categories to start the process. Additionally, as Heery and Anderson point out, there is a need to improve the process of metadata creation. They conclude that this may be achieved by the provision of better tools for metadata formation, by a degree of automation (Heery & Anderson 2005, 18). A system that recognises the user at the login stage and automatically populates their details into a web form could be one stage in the process. PEDESTAL's file uploader could include 'best guess' information for the first file uploaded. This information could be gathered from the resource contributors department details, interests, and so on. Information entered into the system at the first file upload stage could be cached and used as seed-data for subsequent deposits.

7.2 Support for discussion

In the early phase of the launch of PEDESTAL a simple weblog system will be provided. We are aware that some individuals have an existing weblog(s), or they want more sophisticated features such as those offered by weblog providers. In these cases an RSS feed could be used to bring their external postings into PEDESTAL. This will ensure a degree of flexibility for current weblog users to continue with their existing service; for new bloggers to familiarise themselves with this form of communication; and for both groups to seek out and make use of new providers as and when they need.

7.3 Search and browse options

Google Mini search appliance will facilitate reliable search results for PEDESTAL. It also has the added benefit of being a familiar search tool for the target audience. Google Mini will deliver a single route for access to a range of material held at the institution without having to search systems separately. This will result in a "blended" interface for access to a range of information sources.

7.4 Formal and informal communication mechanisms

Much has been written on formal and informal method of scholarly communication. Formal methods include peer-reviewed journals, conference papers, while informal channels include weblogs, wikis or listservers. Waters (2006) notes that both of these methods are being used by scholars and students to exchange information. Campbell (2005, 4) states that "Researchers, teachers and students are increasingly developing their own personal information management strategies, assuming control over who they choose to share their resources with and adopting a wide range of informal tools and applications to support their communities of practice". PEDESTAL provides for both of these two categories of communication as it offers users weblog facilities, restricted access to enable sharing of working papers between closed groups, and formal publishing to a wide audience.

7.5 Automation features

Walters (2006) suggests that there are a number of new opportunities to enhance IRs to facilitate delivery and collection of content in new ways. Walters stresses that we should not be relying on faculty members alone to provide repository

content. Walters also lists some useful possibilities for transfer of content including: passing an individuals bibliographic citations between an IR and personal web page; and the syndication of wiki and weblog content. Both of these are possible via PEDESTAL.

7.6 Teaching resource repository service diagram

PEDESTAL will operate alongside existing services at the institution. The university currently hosts a range of systems provided by a variety of departments. The University Library maintains the Institutional Repository (research repository) and Loughborough Online Reading List System. Corporate Information Services runs the Publications Datababase, engCETL manages ImagePool and the university's VLE is provided by Computing Services. Additionally, a number of the institution's web sites are included in the list of sites indexed by Google Mini. Figure 2 illustrates how these systems can be brought together to provide useful services for resource creators and end users.
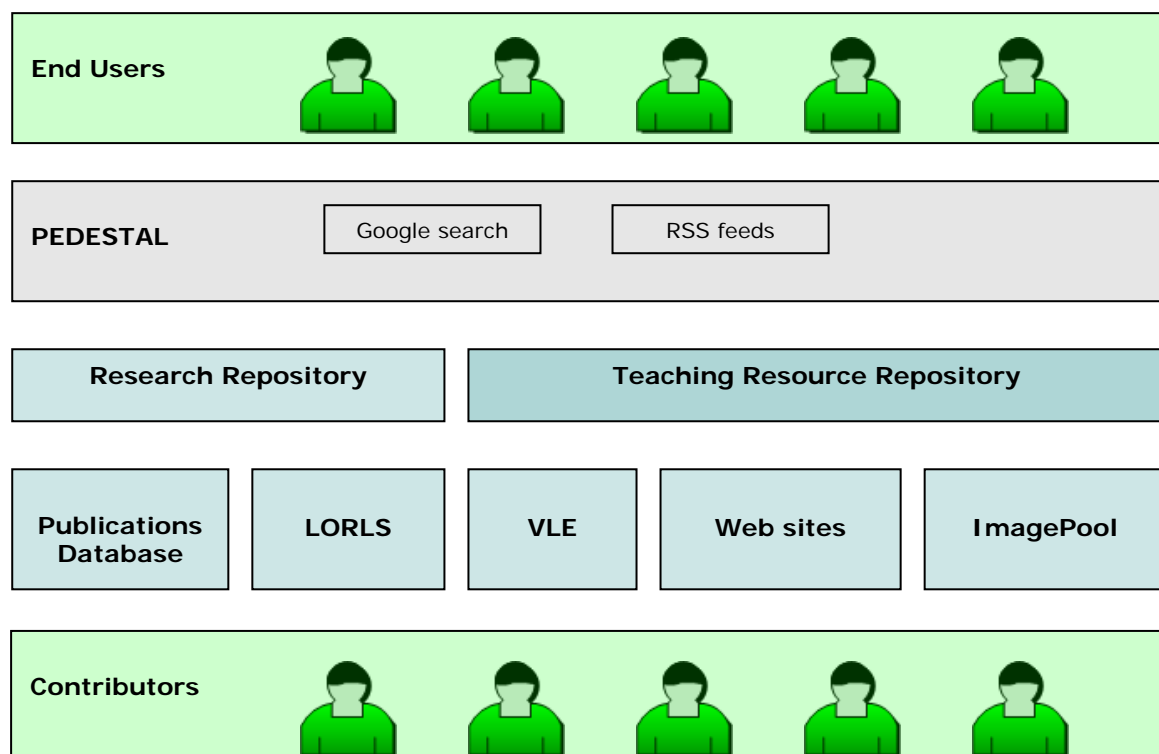

Figure 2: Teaching resource repository service diagram

8.0 Conclusion

The Rights and Rewards project's demonstrator repository is currently (November 2006) being implemented, with pilot groups scheduled to test the service early in 2007. PEDESTAL will provide creators of teaching resources with a platform to share these items within the institution, and further afield.

PEDESTAL includes features that automate a large portion of the information required to provide a comprehensive personal profile for individuals. It pulls content in from existing systems and pushes content out with RSS feeds. Contributors will be able to share physical resources as well as information and expertise through their individual weblog. In this way both resources and discussions will be accessible to a larger number of practitioners.

Depositors of items are encouraged to add their own metadata to tag items, thus making it easy for others to locate useful resources. These additional tags and any supplementary information will also help to guide the reuse of items.

It has been our aim from the outset to try to deliver a service that has been designed around the needs of users. Surveys and interviews have provided a wealth of information regarding useful features, service requirements and rights to be protected. The pilot groups testing PEDESTAL will provide data that focuses more on the demonstrator service and how it can best be tailored to meet the needs of the user community.

Acknowledgements

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