



## Final Report

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<b>Project Manager &amp; contact details</b>	Martin Moyle		
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**EMBRACE**

**EMBedding Repositories And Consortial Enhancement**

**Final Report**

Martin Moyle, Digital Curation Manager, UCL Library Services

Rebecca Stockley, SHERPA-LEAP Project Officer

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## **Project Board**

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- Sally Rumsey (ORA Service & Development Manager, Oxford University Library Services)
- Rebecca Stockley (UCL Library Services, Project Officer)

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- Nicola Wright (Information Services Manager, London School of Economics and Political Science)
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- Adam Field and Sebastian Francois, EPrints team, University of Southampton

## **Executive Summary**

EMBRACE (EMBedding Repositories And Consortial Enhancement) was an 18-month project led by UCL on behalf of the SHERPA-LEAP (London Eprints Access Project) Consortium, a group of 13 University of London institutions with institutional repositories.

The project had two strands, technical and strategic. In its technical strand, EMBRACE aimed to implement a number of technical improvements to enhance the functionality of the SHERPA-LEAP repositories. In a concurrent strategic strand, EMBRACE set out to investigate the challenges of embedding repositories of digital assets in institutional strategy to ensure repository sustainability.

Part of the earlier work of SHERPA-LEAP included the creation of a hosted repository service for the partners, and the first aim of the technical work was to upgrade the repositories housed on the shared platform from EPrints 2 to EPrints 3. At the same time, the architecture of the hosted repository service was developed to provide better isolation of the constituent repositories. Having upgraded and re-engineered the service, the project went on to implement two pieces of functionality: the Scholarly Works Application Profile (SWAP), to support interoperability, and a cover page generator, to add automatically provenance and citation information to full-text eprints at the point of download. Finally, a training programme was arranged for the SHERPA-LEAP partners, to enable them to make the most of the features and functionality of the upgraded software

The strategic strand of the project set out to examine the challenges of embedding repositories in HEI strategy. The partners felt that there had been problems in persuading HEIs to acknowledge that digital objects created by their researchers and teachers are intellectual assets of the institution, and that they should be managed in appropriate and sustainable ways. External consultants from the RAND Corporation were appointed to undertake an investigation across three SHERPA-LEAP partner institutions. The scope of the strategic investigation was deliberately not limited to 'traditional' eprints (that is, published research outputs), but included electronic theses, learning objects, multimedia assets and even primary data.

The technical work of the project resulted in the successful enhancement of the partner repositories, and the cover page generating tool has been released on an open source basis. The strategic work delivered two main outputs: a full report on the work of RAND in drawing on stakeholder interviews which identifies drivers for, and barriers to, repository sustainability; and a supplementary, 'briefing paper'-length digest of the main report, concentrating on the interventions which can be taken by repository managers and champions to address the challenges of embedding repositories. Both documents are in the public domain. The Briefing Paper is explicitly designed for adaptation and local customisation by HEIs. The RAND report emphasises the importance of establishing a clear vision for the repository, and of close communication with stakeholders, if a repository is to succeed.

## **Background**

EMBRACE built on the work of the SHERPA-LEAP Consortium, which, with funding from the Vice-Chancellor of the University of London, has helped to create open access institutional e-prints repositories at 13 University of London (UoL) institutions.

SHERPA-LEAP was established in February 2004 with an initial membership of 7 Higher Education institutions. The project aimed to create eprints repositories for each of the partner institutions, and to populate those repositories through collaborative advocacy. The repositories were hosted centrally by UCL. In 2005, a second, 18-month phase of SHERPA-LEAP began, which saw the extension of the partnership and the appointment of a full-time Project Officer. A third phase of SHERPA-LEAP was established to deliver a cross-searching service for the repositories, and a fourth phase, also 18 months, is scheduled to begin in March 2009.

The SHERPA-LEAP partners had been active contributors to the national and international open access agendas. In June 2005, the partners held the SHERPA-LEAP Conference on Open Access to Research. The Conference attracted a distinguished panel of speakers, and was attended by 90 members of UoL academic staff. A second Conference was held in June 2007, attended by 70 academic researchers. The partners also held a regional (London and the South-East) workshop on IRs for Repository Managers in March 2007. Another conference and at least one more workshop are planned for 2009.

The SHERPA-LEAP repositories were in various stages of development at the outset of EMBRACE. Some institutions had used the project to identify and review their wider institutional requirements for a repository, before migrating away from the centrally-hosted service to an institutional implementation. Other partners were further away from production services. Meanwhile, repository content across the consortium continued to grow, with new material being added daily. Common issues across the consortium, however, included the types of object to be collected; relationships with pre-existing research publications databases; support for RAE 2008; the ideal position of the IR in the institutional research workflow, and how to embed it there; and the software needed to support all these requirements.

EMBRACE aimed to address some of these common issues. On the technical front, EMBRACE aimed to improve the hosted repository service, with architecture improvements and a software upgrade. The Scholarly Works Application Profile was implemented for the hosted repositories, and advocated to the other LEAP partners, to improve interoperability. A cover page generating tool was seen as a priority by many LEAP partners who were concerned about loss of research impact through inaccurate citation (or non-citation) of downloaded research papers. A training programme for the LEAP partners was arranged to support the implementation of these technical measures.

EMBRACE also sought to address some common sustainability issues by exploring some of the challenges of embedding repositories of digital assets in institutional strategy. It is the responsibility of an institution to manage its digital assets in a sustainable way, although the absence of such commitments from the Information

and IT Strategies which were publicly available during the planning stages of EMBRACE suggested that this responsibility was not yet widely recognised within UK HE, despite the fact that a repository has the potential to empower an institution by increasing research efficiency, enriching the student experience, and helping to streamline business processes.

Within the LEAP partnership there is substantial diversity: the partner institutions represent a mixture of size and mission, ranging from the large, multi-disciplinary and research-led, to the smaller and highly-specialised. It was felt that this range of institutions could make the SHERPA-LEAP consortium an ideal testbed in which to examine and test the issues relating to the sustainable embedding of IRs in institutional thinking. EMBRACE sought to appoint experienced consultants who would use standard techniques, such as interviews, at a minimum of 3 SHERPA-LEAP partner institutions (each different in terms of size and mission).

The EMBRACE partners were aware of the outputs of the JISC-funded espida project, which offered support for the sustainable embedding of repositories at organisational level. The espida model combines a method and a set of tools which together help to articulate the value of proposals, where that value may otherwise be intangible or difficult to communicate. Central to espida is the 'balanced scorecard' approach, which facilitates the consideration of a proposal from four different overall perspectives: how would the proposal meet customer or external stakeholder needs? How would it contribute to a culture of innovation and development within an organisation? What positive contribution would it make to internal business processes? And what would it contribute to the financial bottom line, in terms of cost savings or revenue generation? Each of the 4 perspectives is further broken down into a set of elements for assessment, which may change depending on the nature of the proposal, and to whom it is being addressed.

For EMBRACE purposes, the espida model was recognised as an ideal type framework that facilitates the investment decision-making process. The framework was acknowledged as a useful conceptual tool, although it was also felt that it may not be easy for organisations to engage with the full espida conceptual model. It was agreed that, for the EMBRACE study, espida would be used as a source of reference and, where possible and appropriate, a structuring tool. Meanwhile, the EMBRACE partners sought to build on and supplement the espida work at a more practical level by identifying key stakeholder groups and assessing their views. The EMBRACE outputs would therefore identify the barriers and motivations 'today'. The consultants were charged with producing a report and a toolkit to support the strategic case for the institutional embedding of digital repositories, in their widest sense, including repositories of learning objects and primary data as well as e-theses and research outputs.

It was hoped that the outcomes of the EMBRACE study would accurately reflect the questions, issues and measures which would need to be considered when a proposer is pursuing a strategic commitment to resourcing and sustaining Institutional Repositories of digital assets.

## **Aims and Objectives**

The initial aims of the EMBRACE project were as follows:

- To upgrade the SHERPA-LEAP hosted repository platform from EPrints 2.3 to EPrints 3.0.
- To restructure the architecture of the hosted repository service, in order to make the repositories more robust and more easily configurable to meet local functional requirements.
- To implement a citation watermarking facility, in order to optimise the impact of the research papers deposited in the hosted repositories.
- To implement the Eprints Application Profile at each SHERPA-LEAP repository.
- To investigate issues around the strategic commitment of institutions to repository sustainability by carrying out case studies at SHERPA-LEAP institutions.
- To consolidate the results of the case studies into a toolkit adapted specifically to support the embedding of IRs in institutional policies and strategies.

These aims remained unchanged in the course of the project.

The aims relating to repository strategy were, naturally, subject to some refinement as the project evolved: in particular, what a "toolkit" might actually look like was always likely to depend on the findings of the consultancy process. The objectives for this part of the project were further defined as follows:

- To investigate issues around the strategic commitment of institutions to repository sustainability, specifically considering the institutional stewardship of digital assets
- To identify drivers for, and barriers to, the embedding of digital repositories in institutional strategy
- To synthesise the above drivers and barriers into a strategic toolkit identifying the questions, issues and measures to be considered when a proposer is pursuing a strategic commitment to resourcing and sustaining repositories of digital assets within a HE institution.

The scope of the study was further refined, as follows:

- Although technical infrastructure, skills and organisational structure are integrated aspects of the embedding of digital repositories within HEIs, the study would focus on commitment, drivers and barriers at a strategic level.
- Senior-level attitudes and practices at three SHERPA-LEAP institutions of differing size and mission would be studied.
- The outputs from Espida would be taken into account in the investigation.
- The digital assets under consideration would include research eprints, e-theses, learning objects and courseware, and primary datasets.



## **Methodology**

The methodology for the technical enhancements was fairly simple. A Technical Officer based at UCL worked on the reconfiguration and upgrade of the hosted repository service, including the integration of the Scholarly Works Application Profile export plugin. Work on the cover page tool was outsourced to the EPrints team at Southampton. The EPrints team worked in conjunction with the SHERPA-LEAP Project Officer, who firstly helped the Southampton team to refine the consortium's requirements from the tool, and then participated in iterative testing.

For the strategic work, for which RAND Europe was engaged, a detailed methodology was drawn up. In overview, the methodology involved interviews at three LEAP institutions, punctuated by meetings with the Project Board to help to shape the analysis.

The participating institutions were Birkbeck, LSE and UCL. The approach was structured into five tasks: (1) exploratory interviews; (2) internal structuring workshop; (3) semi-structured interviews; (4) analysis and synthesis; (5) reporting. In more detail:

(1) Exploratory interviews. It was agreed that the study would begin with three exploratory interviews with key informants at each of the participating institutions. Informants would be asked to list the main issues around the strategic commitment of institutions to repository sustainability, and the drivers for and barriers to the embedding of repositories. The interviews would be structured according to categories identified by the espida model, to help to delineate the extent to which there were disparities between SHERPA-LEAP's objectives and the institution's strategic objectives. The Board would help RAND to select one key informant from each of the institutions; interviews would be conducted by two members of RAND, and would be about an hour in duration.

(2) Internal structuring workshop. It was agreed that the results of the exploratory interviews would be presented to an internal structuring workshop attended by the RAND project team and members of the EMBRACE Project Board. In several iterative rounds, the findings would be clustered and prioritised, resulting in aggregated lists of key issues, drivers, barriers and potential initiatives to overcome these.

(3) Semi-structured interviews. It was agreed that a second round of interviews would take place, aimed at validating and adjusting the initial findings. There would be around 15 interviews, the selection of interviewees to be distributed across the institutions and across different functions and positions. The interviewees were first to be asked to explain the extent to which they agreed with the initial list of key issues, barriers, drivers and initiatives, and how far these aspects applied to their institutions. They would then be given the opportunity to identify gaps in the preliminary analysis, to discuss additional issues, barriers and drivers, and to suggest interventions which might work in their own institutional context.

It was agreed that these interviews should target key strategists and stakeholders, ideally including Heads of academic departments, senior administrative staff with responsibility for research strategy and teaching strategy, the chief Librarian, and the

repository manager. The participating institutions were each asked to identify prospective interviewees and to provide introductions to the RAND team, who would then contact the individuals in question to arrange the interviews. RAND also sought relevant documentation about the mission and vision, strategic planning framework and committee structures from each of the institutions.

Interviews in all cases were to be attended by 2 members of RAND, and would take 60 minutes, which could be extended to 90 minutes with the interviewee's consent. The interviews would be recorded (to facilitate reporting). Summary reports of the main findings would be prepared, and interviewees would have the opportunity to sign these off. These summaries would not be shared with the Project Board. Finally, it was agreed that in the final report, the names of interviewees would be listed only with their consent, and none of the content of the report would be attributed directly to any interviewee.

(4) Analysis and synthesis. It was agreed that RAND would aggregate the barriers and drivers identified in previous tasks into a series of steps that senior management should go through on its route to successfully embedding a digital repository. These steps would form the basis of the "toolkit", which would specify key questions, issues and measures. A second internal working session with RAND and members of the Project Board would be convened in order to facilitate this task. At the workshop, the accumulated results of the previous tasks would be analysed and synthesised, focusing on the barriers and facilitators at each step in the elaboration of a business case for a repository.

(5) Reporting. It was agreed that RAND would produce two complementary deliverables: a full report on the methods, results and conclusions of the EMBRACE Case Study, and a shorter "toolkit" focusing on the key findings. Drafts of both outputs would be presented to the Project Board for comment, as well as being subject to the approval of RAND's internal quality assurance reviewer.

## **Implementation**

The technical implementation proceeded in line with the methodology outlined above. The hosted repository service was successfully upgraded and partitioned without incident. The Scholarly Works Application Profile export plugin was developed by the EPrints team at the University of Southampton during the early part of the project, and it was installed on 5 UCL-hosted repositories by the SHERPA-LEAP Project Officer.

Initial requirements for the cover page tool were as follows:

- (i) it should add a cover page to a PDF file, which would contain customisable information about the repository, logos, policies, metadata, etc, using the 'generate on-demand' approach;
- (ii) for the PDF manipulation, external (linux) tools and libraries would be used.
- (iii) the repository should be able to define which types of eprints have covers (eg articles, book chapters, theses).

- (iv) the repository should be able to define the cover page that should be applied for each eprint type: in each case, which text, images and metadata appear where on the cover; and
- (v) the repository should be able to define what happens when a cover page cannot be generated for some reason.

The implementation of the tool took these requirements on board. It was constructed with the following features:

- The covers are defined as TeX documents. They are compiled to PDF with 'pdflatex'. The cover and the original PDF files are then merged with 'pdftk'.
- Cover pages are stored under the EPrints document structure.
- To create a new cover, the repository defines which type of EPrints require a cover, and you then write appropriate TeX. The installation files include some simple examples.
- Covers are re-generated in any of the following situations:
  - o a PDF document does not have a cover
  - o the phrases file is more recent than the existing cover
  - o the metadata about the eprint is more recent than the existing cover.
- If an error is encountered (for instance, if the PDF file is encrypted and cannot be merged with a cover page), either the original PDF is served without a cover page, or redirection to an error page takes place. This behaviour is configurable according to the preference of the repository administrator.
- The content of the error page is configurable.
- The system can be set to email the repository administrator in the event of an error.

The 'on the fly' cover page generating tool was installed on two UCL-hosted LEAP repositories for testing and development purposes. Once signed off, it was released through the EPrints software suite at Southampton.

To help to embed the technical changes, the SHERPA-LEAP Project Officer organised two training programmes for the technical and administrative staff within the consortium. The first training programme was held on three occasions and introduced the LEAP staff to the new server architecture and software configurations associated with the repository enhancement. The second training programme was led by the University of Southampton's EPrints team. It encompassed advanced repository configuration, SWORD, and IRStats, and also provided a 'repository surgery' for institutions seeking dedicated and specialised support.

The implementation of the strategic work of the EMBRACE project proceeded in accordance with the methodology which was agreed with the consultants. With the help of local contacts, 16 interviewees were identified, with a good spread of roles (the list of interviewees is given at Appendix A). Seven categories of stakeholder were consulted: researchers, lecturers, Heads of department, senior HEI managers, external relations, library and IT. Requirements for the 'toolkit' began to evolve once the main body of work was near completion: it was agreed that for these purposes the consultants should focus on a short briefing report emphasising the interventions which might be made to embed repositories, concise enough that it might be given to a Vice-Chancellor to read, with graphics to break up the text, and that it should be

explicitly reusable and adaptable by members of the UK HE community to serve their own purposes in securing repository sustainability. A briefing paper meeting those specifications was accepted by the Project Board.

Both RAND reports are freely available, both from RAND and from the UCL Eprints repository.

## **Outputs and Results**

The technical outputs of EMBRACE were as follows:

- The UCL-hosted SHERPA-LEAP repositories were upgraded to EPrints 3.0.
- The Scholarly Works Application Profile Export Plugin was installed at 5 UCL-hosted LEAP repositories.
- Training sessions were arranged for members of the consortium to support the new technology.
- An automatic cover page generating tool was specified, tested within 2 UCL-hosted EPrints environments, documented, and made freely available for download by the GNU EPrints community.

Turning to the strategic outputs, a number of findings emerged from the case studies. The impression that repositories are 'under-utilised' was confirmed, as was the fact that there are significant barriers to finding strategic commitment to repositories by parent institutions. More encouragingly, however, there is no fundamental disapproval of repositories from any one stakeholder group, and little opposition to the development of and investment in repository technology. There is, though, a recognition that the potential benefits are intangible, that they will not be visible until a critical mass is reached, and that there is so far little quantitative evidence that they will outweigh the costs. Meanwhile, there is difference in opinion between different stakeholder groups, disciplines and institutions as to what a repository is, and what it could or should do; and there is rarely a coherent institutional vision of how a repository can help that institution to deliver its mission.

The different motivations for repository investment which were expressed by subsets of interviewees from the seven different stakeholder groups were characterised as follows:

- Fear of missing the boat – willingness to invest in technology which is relatively new, but which is set to become commonplace.
- The repository as a shop window for the Institution.
- Archiving and preserving digital assets.
- Open access, and the democratization of research.
- Aspirations to decrease dependence on the traditional cost model of publishing.
- A tool to support internal management and external funding decisions.
- Opportunity to add value and to exploit the content of repositories.

The lack of a common understanding of IRs may be one of the main barriers to embedding them in the daily operations of HEIs.

The team delineated the barriers to repository sustainability, as identified by the stakeholders in interview. The barriers fell into 6 groupings, as follows:

- Novelty of repositories. This has many implications, for instance: there is no common definition of a repository, no shared vision, no critical mass of content, insufficient awareness about the nature and potential of repositories, little direct involvement from senior management, no clarity about roles and responsibilities for repositories within an institution.
- The difficulty of introducing change in the academic context: academic departments are conservative by nature; institution-wide initiatives are often hard to implement; academics already have networks for communication and research-sharing.
- The perception that repository population is a burdensome process: repository deposit is a low priority for academics compared to other work; repositories are not yet regarded as user-friendly, workload-relieving tools.
- The complexity of the environment: HEIs are complex, and one size does not fit all; the external landscape, particularly copyrights, is also complex, and legal considerations are slowing down repository development.
- Incentives to participate are not always present: repositories are not embedded in performance structures, eg appraisal. Career-young researchers may be readier to participate than colleagues with longer track records. Sustainable resources have not yet been devoted to repositories.
- Concerns about reputation damage: the suggestion that academics may be reluctant to see their research stored and presented alongside work of 'inferior' quality, or a general lack of confidence in the quality of the repository brand.

The team went on to identify ways in which these barriers might be overcome. Broadly, these fell into three categories:

- Develop a strategy and a shared vision across the institution.
  - Be clear about the institutional vision of the repository.
  - Be clear about how the repository will be managed, and what resources it will have available.
  - Take care over the branding of the repository.
- Communicate the benefits of repositories.
  - Communicate with all stakeholders: events and marketing can be targeted to specific stakeholder groups.
  - Consult stakeholders to develop the repository.
  - Take into account disciplinary differences within the institution.
  - Involve Heads of department and other senior champions.
  - Tie in with existing communications networks.
  - Clarify copyrights, and explain repository collecting and quality strategy.

- Provide incentives
  - Link the repository to the frameworks for external research assessment and/or to academic promotions.
  - Reduce the administrative burden, especially for content providers.
  - Take into consideration the specific characteristics, interests and requirements of departments and institutions.

The Project Board felt that the RAND report offered a very sure treatment of the evidence and conclusions drawn carefully from that evidence.

### **Outcomes**

The report and briefing paper were prepared for SHERPA-LEAP, but will be of interest to other HEIs with digital repositories. Details of the report have been circulated to appropriate blogs and lists, and are due to be presented at a JISC event in February. In general, the report may be of interest to university researchers, lecturers, library staff, senior managers and other stakeholders in the distribution of scholarly knowledge, including publishers and research funders. At the time of writing, links have been made with the RSP to widen dissemination of the EMBRACE reports. It has recently been translated into Japanese by the NII Institutional Repositories Program, the 70-member national Japanese repository consortium.

The methodology implemented by RAND was tried and tested before the project began, and it proved to be sound. It will be repeatable by any group of HEIs wishing to make qualitative investigation of a research hypothesis.

On the technical side, the main benefit to the wider repository community is the cover page generator. This offers a simple contribution to a longstanding problem: that of how to ensure that the high numbers of downloads which repository deposits are known to be receiving are translated into research impact through increased citations. An automatic header page explaining exactly what a consumer has downloaded and, most importantly, how it should be cited, may help to ensure that more research is correctly attributed in future.

SWAP is available as a metadata export format from the LEAP repositories, but it is not clear that practical benefits are yet brought by SWAP either to researchers or to the repository community.

### **Conclusions**

The technical part of the project benefited all the LEAP repositories. The hosted repository service was successfully partitioned and upgraded; and the Scholarly Works Application Profile export plugin was installed on 5 UCL-hosted repositories and made available to the rest of the LEAP community, and all institutions attended at least one of the training sessions that were arranged to support the technical work of the project. The cover page generating tool is now in the public domain, sustained by the University of Southampton as part of the EPrints suite, and will potentially benefit the wider repository community.

RAND's work was based on qualitative interpretations of a series of interviews and group working sessions. Where relevant, the results were supported by findings

from the literature, but the literature was not reviewed in any exhaustive or systematic way. The study is a snapshot of stakeholder views, and it would be incorrect to extrapolate the findings to other institutions. However, the study should nonetheless be of interest to institutions outside the LEAP partnership. The lists of drivers, barriers and interventions are long, well-organised, backed up by evidence and discussion, and they certainly ring true. In some respects the findings, notably the interventions, are obvious, but that at least offers confirmation that the repository community is working on the right lines, even if change is slow in coming.

## **Implications**

Further work could usefully be undertaken to support the practical application of the cover page tool. For instance, a short piece of work to produce guidance on how eprints of different publication type should be cited might be warranted. Such work should take into account the work of relevant JISC work such as the EThOS, Versions and Kultur projects, and the requirements of any external research assessment exercises such as the UK's REF. Standardisation in the area of eprints citation could help to safeguard the correct accreditation of research and help to maximise its impact.

In terms of its functionality, the cover page tool only supports PDF format at present. Extending its capabilities so that it could interact with eprints in other file formats would be a useful piece of work. Finally on the cover page tool, it could also be platform-neutralised. Producing a generic tool in the first instance was an early aspiration for EMBRACE, but in the context of the project it would have been prohibitively expensive. Discussions with the Programme Manager and UKOLN on the matter of extending the portability of the tool have taken place.

SWAP, as things stand, adds little to the LEAP repositories. It would be helpful to see SWAP adopted by a harvesting service such as Intute Repository Search. (Alternatively, the LEAP consortium has a demonstrator aggregation service, LASSO (LEAP Aggregated Search Service On-line), which could experiment with SWAP if funding were available.)

As noted above, the strategic study undertaken as part of EMBRACE was based on a limited sample of interviewees from a small (if carefully chosen) number of institutions. The results are interesting, but it is not claimed that they offer anything more sophisticated than a snapshot. A more quantitative approach based on a large sample of respondents would be a logical follow-up to the RAND study.

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<http://www.ukoln.ac.uk/repositories/digirep/index/EprintsApplicationProfile>

Scholarly Works Application Profile Export Plugin for EPrints:

<http://files.eprint.org/321>

EMBRACE cover page generating tool, with documentation:

<http://files.eprints.org/392/>

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