

# JISC DEVELOPMENT PROGRAMMES

## Project Document Cover Sheet

### CD-LOR Final Report

#### Project

<b>Project Acronym</b>	CD-LOR	<b>Project ID</b>	
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<b>Lead Institution</b>	Glasgow Caledonian University (previously University of Dundee)		
<b>Project Director</b>	Prof. Allison Littlejohn		
<b>Project Manager &amp; contact details</b>	Colin Milligan Centre for Academic Practice and Learning Enhancement University of Strathclyde, 50 George Street, Glasgow G1 1QE Tel.: +44 (0)141 548 3072 Fax: +44 (0)141 553 2053 E-mail: <a href="mailto:colin.milligan@strath.ac.uk">colin.milligan@strath.ac.uk</a>		
<b>Partner Institutions</b>	University of Strathclyde and Intrallect Ltd.		
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Dr David Nicol, Deputy Director, Centre for Academic Practice and Learning Enhancement, University of Strathclyde, acted as consultant to the project and provided input to the initial Learning Communities Report and to the Structured Guidelines.

The project worked with a number of associate partners:

1. **UHI Millennium Institute.** Contact: UHI's Learning Materials Manager John Casey.
2. **Aberdeen University.** Contact: Dr. Colin Calder.
3. **University of Ireland, Galway.** Contact: Dr Iain MacLaren, Director of the Centre for Excellence in Learning & Teaching (CELT) at the National University of Ireland, Galway.
4. **SIESWE Learning Exchange (formerly Stòr Cùram (Scottish Institute for Excellence in Social Work Education)).** Contact: Neil Ballantyne, Learning Technology Manager.
5. **Jorum.** Contact: Michael Dodds, Jorum Outreach and Promotions Officer, MIMAS.
6. **IVIMEDS: The International Virtual Medical School.** Contact: Prof. Ron Harden, Dundee University.
7. **Spoken Word Services (formerly The Spoken Word Project).** Contact: David Donald, Project Manager.
8. **IVINURS: The International Virtual Nursing School,** Contact: Linda Martindale,
9. **Edinburgh University's LORE (Learning Object Repository for Edinburgh),** Contact: Sarah McConnell.

The project is also grateful for the guidance provided by the members of our steering group:

- **Rob Alton** (temporarily standing in for Dawn Leeder in representing UCEL)
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- **Neil Jacobs**, JISC Digital Repositories Programme Manager
- **Mark Kornbluh**, JISC/NSF Spoken Word Project, Michigan State University
- **Dawn Leeder**, UCEL Project, Cambridge University
- **Allison Littlejohn**, The Caledonian Academy, Glasgow Caledonian University (Project Director)
- **Linda Martindale**, IVINURS, University of Dundee
- **Lou McGill**, JISC DeL and SHEFC Transformation Projects Programme Manager
- **Charles Oppenheim**, JISC Digital Repositories Advisory Panel; Rights and Rewards Project, Loughborough University
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## Executive Summary

CD-LOR aimed to investigate barriers and enablers to successful embedding and use of LO repositories, in support of teaching and learning, within a diverse range of learning communities, including those based in individual and federated institutions and those that exist across institutions (regionally, nationally and internationally), e.g. discipline based communities, or communities coalescing around use in teaching and learning of particular formats, such as sound files.

The approach taken by the project planned combined desk research with stakeholder consultation. The project worked with a number of associate partners who were all running, or in the process of setting up, Learning Object Repositories. The main focus of the project involved identifying possible drivers, barriers and enablers to uptake and embedding of LO repositories within such communities; then working with associate partners to prioritise, develop, implement, test and evaluate a range of potential solutions to these barriers in live test-beds with real learning communities. This work resulted in the production of a series of use cases, case studies and implementation reports of these interventions. One solution deployed involved the development of a software plugin to support searching LO repositories via the established standard SRU (search and retrieve by URL) protocol, and the code developed has been lodged with an open source code repository.

The project found that the barriers to uptake of LO Repositories could be usefully categorised as cultural, pedagogical, technical and organisational, and defined a key set of characteristics (or dimensions) of Learning Object Repository Communities which should be considered when examining Repositories and their uptake by specific communities. These frameworks developed in the early part of the project, provided a strong foundation and common language for the remainder of the project – where common issues identified by the community were collected and used as the basis for development work.

The findings of the project were synthesised to provide the two main deliverables for the project; a set of structured guidelines on LO repository implementation within learning communities; and a complementary set of recommendations to JISC for ongoing research and development in this area.

In conclusion, CD-LOR has presented a comprehensive picture of the LO Repository landscape, providing a new framework through which LO Repositories can be analysed. Utilising this framework, and the set of structured guidelines produced from it, new LO Repository implementations may be planned and existing repositories evaluated. Alongside the Structured Guidelines, the Recommendations for Future Research and Development provide a clear summary of immediate work required in the Learning Object Repository arena.

## 1. Background

The term 'Learning Object' has come to represent the concept of a highly granular digital resource developed to meet a single learning objective. Such LO's may be aggregated to form larger units, and may be incorporated into a range of learning activities, be they entirely online, within blended learning, or classroom based. Key to the idea of LOs is that they should be durable, interoperable, reusable and shareable. Learning Object (LO) Repositories have emerged in recent years to support the storage, management, sharing and reuse of teaching and learning resources within and across learning communities.

Despite increasing acceptance of learning objects and the concepts of sharing and re-use of educational content, the implementation of LO repositories within learning communities is still relatively immature. Recently there has been a shift in focus "in an attempt to identify and analyse the factors that influence practical uptake and implementation of learning objects"<sup>1</sup>. Koper et al (2004)<sup>2</sup> found that, in spite of the growing availability worldwide of reusable LOs and LO repositories, educators still have to "cope with major problems when trying to find, retrieve, adapt or use materials". Often the effort required to re-use a Learning Object often outweighs the potential advantages, and consequently, many course developers will often re-create rather than re-use. Why is this so?

The CD-LOR project has sought to identify and analyse the factors that influence uptake and implementation of Learning Object (LO) Repositories within a range of learning communities.

The above references point to an expressed need within the e-learning community internationally for more information and recorded experience around how learning communities can best be supported by repositories. CD-LOR builds on current R&D work, including that noted above, and related LO repository work within such initiatives as the JORUM+ development project, the Stòr Cùram development project, the HLSI repository, and the WM-Share project. The project hoped to draw together existing evaluative work both nationally and internationally, and take advantage of the availability of a number of LO repository initiatives in the UK and Ireland to test solutions to emerging community requirements in support of the uptake and embedding of LOs.

## 2. Aims and Objectives

CD-LOR aims to investigate barriers and enablers to successful embedding and use of LO repositories, in support of teaching and learning, within a diverse range of learning communities. Such communities include those based in individual and federated institutions and those that exist across institutions (regionally, nationally and internationally), e.g. discipline based communities, or communities coalescing around use in teaching and learning of particular formats, such as sound files.

The original aims of CD-LOR were defined as:

1. Creating a typology of learning communities, mapping their characteristics in relation to their use (or potential use) of LO repositories;
2. Identifying possible drivers, barriers and enablers to uptake and embedding of LO repositories within such communities;
3. Prioritising, developing, implementing and testing a range of potential solutions to barriers in live test-beds with real learning communities;
4. Producing use cases, case studies and a set of structured guidelines on LO repository implementation within learning communities;
5. Producing recommendations for institutional managers on wider policy, strategy, systems and workflow issues;
6. Developing institution-wide use cases linking LO repositories to wider information management processes;

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<sup>1</sup> Campbell, Lorna M. (2003) Engaging with the learning object economy. In: Littlejohn, A. (Ed.) Reusing online resources: a sustainable approach to e-learning. London, Kogan Page. p.36

<sup>2</sup> Koper, R. et al (2004) Building communities for the exchange of learning objects: theoretical foundations and requirements. In: ALT-J Research in Learning Technology, vol.12,no.1 (Mar. 2004), pp21-35.

7. Investigating and reporting on personal resource management practices and strategies of individual stakeholders within learning communities;
8. Making recommendations to JISC for ongoing research and development.

Note: Objectives 5 and 6 were dropped midway through the project as the project team found that institutional policy on knowledge management was not well developed and that the resources available for this work would not be sufficient to carry out the comprehensive survey of policy needed. Instead, effort was concentrated on developing the community dimensions and associated structured guidelines.

### 3. Methodology

The overall CD-LOR strategy was to begin with desk research, informed and evaluated by consultation with stakeholders, represented primarily by the project associate partners, with a number of collaborative partners, and individual experts on the Steering Group. This consultation identified specific drivers, barriers and potential enablers to the uptake and embedding of LO repositories. Possible technical and process/workflow solutions to those barriers were prioritised by the stakeholders, and implemented and evaluated in pilot studies within the associate partners' learning communities and repositories. Further desk research and consultation was carried out in parallel to this work, to provide wider and deeper context by investigating personal resource management strategies of individual stakeholders within institutions. Structured Guidelines for the implementation and evaluation of LO repositories within learning communities were developed throughout the project,, beginning with the initial mapping of communities and issues, and subject to revision as stakeholders were consulted and solutions were evaluated.

### 4. Implementation

The project progressed through the following six stages:

- 1 Initial desk research. This principally involved a literature review of characteristics of learning communities in relation to LO repositories. The review included relevant educational and social sciences research, and an analysis of documentation produced by LO repository R&D communities
- 2 The review enabled a mapping of learning community types currently supported by LO repositories, and a comparative description of models of LO repository use. The output from the review and mapping activities was a report elucidating current LO repository models and practices, and beginning to link types of learning communities with specific enablers, barriers and drivers to the uptake and embedding of LO repositories. This report formed the basis for the structured guidelines produced.
- 3 The above desk research was extended and evaluated through stakeholder consultation utilising the input of the associate and collaborative partners, and the wider HE/FE community. An initial workshop was held to build on the desk research report, detailing barriers and possible solutions identified.
- 4 Priorities for implementing and testing the solutions identified were developed in consultation with the associate and collaborative partners, the wider programme, and JISC. Both technical and procedural/workflow use cases were developed, implemented and tested within the associates' LO repositories/learning communities. Findings from this activity were instrumental in developing technical recommendations. This work also led to the development of a software plug-in with associated documentation. Additionally, both technical and process/workflow solutions tested resulted in refined use cases, case studies and evaluation reports on each solution.
- 5 Running parallel to, and feeding into the above steps, CD-LOR reviewed personal resource management strategies of individual stakeholders within institutions, via desk research, interviews and a survey. The review was designed to investigate such questions as: How does an individual lecturer find, create and store their teaching resources?; and How do they share them with other staff in their department or subject area? The Personal Resource Management Strategies Report supported the work of the rest of the project by ensuring a good fit for solutions tested and guidelines produced with the micro-context of individual community members' working and learning practices. A plan to conduct a similar study of institutional policy and strategy on knowledge

management was dropped after initial investigations demonstrated that practice in this area was not well developed.

- 6 In the final phase of the project, an effort was made to integrate all the project findings into a set of final deliverables with wider value; a set of structured guidelines, presented in paper and electronic format, and a set of recommendations. The recommendations may be used by the JISC to plan future activity in this area in seeking to investigate how repository issues impact the repository arena and the other areas which JISC has responsibility for. The structured guidelines effectively transform the findings of the project into a toolkit that has real value beyond the lifetime of the project, particularly as a tool which can be utilised by subsequent repository projects funded by JISC to quality assure new and existing LO Repository implementations.

## 5. Outputs and Results

The project has produced all deliverables and met its project objectives. The project produced outputs of four types:

- A desk study which analysed current thinking on the factors that influence uptake of Learning Object Repositories. The desk study defined a set of community dimensions of learning object repositories, and detailed barriers to uptake of LORs. The study also provided the initial basis for the structured guidelines.
- Two reports summarising existing practice relating to sharing e-Learning materials and using LO Repositories within the teaching and learning community. These reports represented a large scale survey and a set of interviews with repository users and provided a key insight into the behaviour and needs of the community.
- A set of use cases, collected from our user community, documented consistently and related to the frameworks developed as a result of the desk study. The use cases represent a range of possible solutions to barriers to LOR uptake encountered by the community. A subset of the use cases collected were taken on for further development and three of these solutions were actually implemented in our partner communities, where they were evaluated from both a user and curator perspective. For one use case a software plug-in was developed which has been made available to the wider community under an open source license.
- A set of integrative documents: the Structured Guidelines for implementing a Learning Object Repository and a set of recommendations for further work in this field. These documents were designed to synthesise the findings of the project and draw on all the individual outputs to create lasting valuable outputs from the project. The structured Guidelines were evaluated and refined with the help of the teaching and learning and repository communities, have been widely praised and are already being used.

Specific deliverables are described in the next section and are available from the project web site deliverables page at: <http://www.academy.gcal.ac.uk/cd-lor/deli.html>

## 6. Outcomes

CD-LOR aimed to investigate barriers and enablers to successful embedding and use of LO repositories, in support of teaching and learning, within a diverse range of learning communities. The project has achieved its aims and in doing so has created a series of resources of lasting value to the repository and e-Learning communities. The table below lists the stated objectives of the project (see initial Project Plan section 2.2 – the list here excludes the two objectives relating to institutional practice which were dropped in May 2006, as discussed in Section 2 above.) and states what the project actually achieved, with reference to specific outputs and deliverables as appropriate.

<b>CD-LOR planned to achieve its aims by:</b>	<b>CD-LOR Achievements:</b>
Creating a typology of learning communities, mapping their characteristics in relation to their use (or potential use) of LO repositories	A typology of learning communities was developed as part of the initial desk study carried out and reported in Deliverable 1: 'Report on Learning Communities and Repositories' available from: <a href="http://www.academy.gcal.ac.uk/cd-lor/learningcommunitiesreport.pdf">http://www.academy.gcal.ac.uk/cd-lor/learningcommunitiesreport.pdf</a>

Identifying possible drivers, barriers and enablers to uptake and embedding of LO repositories within such communities	Drivers, barriers and enablers were also identified and analysed in the initial desk study reported above. In addition, a workshop was held which specifically collected issues being faced by our project partners. The workshop report is available: <a href="http://www.academy.gcal.ac.uk/cd-lor/AssociatesWorkshopReport_201105.pdf">http://www.academy.gcal.ac.uk/cd-lor/AssociatesWorkshopReport_201105.pdf</a> along with the workshop resource pack: <a href="http://www.academy.gcal.ac.uk/cd-lor/ResourcePack.zip">http://www.academy.gcal.ac.uk/cd-lor/ResourcePack.zip</a>
Prioritising, developing, implementing and testing a range of potential solutions to barriers in live test-beds with real learning communities	A process of use case collection and prioritisation was undertaken. Eight use cases were chosen for further study and developed. Of these eight use cases, three were implemented, and the other five were further elaborated through interview and discussion with project partners. The use scenarios are available from <a href="http://www.academy.gcal.ac.uk/cd-lor/UseCaseScenarios.pdf">http://www.academy.gcal.ac.uk/cd-lor/UseCaseScenarios.pdf</a>
Producing use cases, case studies and a set of structured guidelines on LO repository implementation within learning communities	The implemented use cases are documented in a series of reports which provide an overview of the identified problem and chosen solution, along with case study material and reflective analysis. Similar reports have been prepared for those use cases for which no implementation was carried out. These reports are available from <a href="http://www.academy.gcal.ac.uk/cd-lor/documents/usecasereports.zip">http://www.academy.gcal.ac.uk/cd-lor/documents/usecasereports.zip</a> The findings from these and other project activities were synthesised into a set of 'Structured Guidelines for setting up and evaluating Learning Object Repositories. The structured guidelines are available from: <a href="http://www.academy.gcal.ac.uk/cd-lor/documents/CD-LOR_Structured_Guidelines_v1p0_000.pdf">http://www.academy.gcal.ac.uk/cd-lor/documents/CD-LOR_Structured_Guidelines_v1p0_000.pdf</a>
Investigating and reporting on personal resource management practices and strategies of individual stakeholders within learning communities	A survey on Personal Resource Management Strategies was conducted and a report on its conclusions written and disseminated. The report is available from: <a href="http://www.academy.gcal.ac.uk/cd-lor/CDLORdeliverable7_PRMSreport.pdf">http://www.academy.gcal.ac.uk/cd-lor/CDLORdeliverable7_PRMSreport.pdf</a> Repository users were interviewed to investigate their perceptions of Learning Object Repositories. The report on these interviews is available from: <a href="http://www.academy.gcal.ac.uk/cd-lor/CDLORdeliverable_UserInterviewsReport.pdf">http://www.academy.gcal.ac.uk/cd-lor/CDLORdeliverable_UserInterviewsReport.pdf</a>
Making recommendations to JISC for ongoing research and development.	A set of Recommendations for Further work and Future Research have been produced and are available from <a href="http://www.academy.gcal.ac.uk/cd-lor/documents/CDLOR_Final_Recommendations_v1p0_000.pdf">http://www.academy.gcal.ac.uk/cd-lor/documents/CDLOR_Final_Recommendations_v1p0_000.pdf</a> A summary is presented in Section 9 below.

Although we feel that all the outputs of the project are valuable, it is the Structured Guidelines and Further Recommendations documents which we feel will be of most use to the wider community as these were written specifically to synthesise the findings of the project.

For the repository community, the Structured Guidelines for Setting up Learning Object Repositories provide a clear guide to the key factors influencing successful repository deployment. The guidelines are primarily written for repository curators, but should also be of use to senior managers. The guidelines define key questions which should be considered, and provide an insight into likely problems and potential solutions to these challenges.

For JISC, the 'Recommendations for Future Research and Development' provide a clear and evidence based set of suggestions of further work which can build on the findings of the CD-LOR project and also test the robustness of these findings. The recommendations are structured around a number of key themes which emerged in the project.

In accordance with the remit of the project, the recommendations are focused primarily on addressing socio-cultural, organisational and pedagogic issues. These are by nature complex issues and they cannot be solved in a straightforward way. The recommendations reflect this complexity. We would urge JISC to take forward the more difficult recommendations rather than considering only the technical recommendations which may seem more immediately tractable.

## 7. Conclusions

The CD-LOR project set out to 'investigate the barriers and enablers to successful embedding and use of Learning Object Repositories'. The methodology chosen, combining desk study and community consultation, provided a broad perspective from which we were able to develop the Structured Guidelines and Recommendations for future research and development. We were able to efficiently collect use cases from the community, and provide solutions based either on new repository functionality, new software plug-ins or changes to practice.

The project has developed a framework within which new Learning Object Repository implementations can be planned and existing Repositories evaluated. This framework encourages the managers of Repositories to recognise and respond to the needs of the community and develop new repositories which serve their needs.

The key outputs of the project have been widely distributed and well received, by other projects within the repositories program and further afield. The structured guidelines have been recommended as a resource for the newly commenced 'Repositories Start up and Enhancement Projects' ([http://www.jisc.ac.uk/whatwedo/programmes/programme\\_rep\\_pres/repositories\\_sue.aspx](http://www.jisc.ac.uk/whatwedo/programmes/programme_rep_pres/repositories_sue.aspx)).

## 8. Implications

The recommendations for Future Research and Development (see next section) provide a comprehensive set of 'next steps' for improving the utility and uptake of Learning Object Repositories. In summary, the key implications arising from this work are as follows:

- LORs should be deployed to meet the needs of their intended user communities. This means that it is vital that these needs are recognised and recorded.
- LORs have a key role to play in promoting sharing and reuse of e-Learning content, especially during development where collaboration is important. This role could be strengthened through the development of web2.0 capability within LO Repositories. The formal structure of repositories can be exploited to provide clear guidance on copyright and usage permissions and to promote productive workflows.
- LORs should be aligned and integrated with existing systems, specifically (where appropriate) institutional learning environments. Their deployment should be and embedded within organisational strategy to ensure that their full value can be exploited across the host institution.
- LORs should be appropriately supported through training, and strategy.
- Funding should focus on the pedagogic need for LO Repositories, rather than focusing on technologically attractive solutions which may poorly serve the needs of the community.

We recognise that the conclusions of this project reflect the small population of LO Repositories we worked with (though we hope that these represent a broad range of current repositories. Therefore, following on from this project, JISC should consider funding efforts to evaluate and refine the Structured Guidelines produced by the project to test their validity. The robustness of the framework of dimensions on which the guidelines are based should also be tested, perhaps considering whether the framework developed may be applied to other domains, or whether the importance of individual dimensions varies consistently with the type of repository.

## 9. Recommendations

Recommendations for Future Research and Development were created as a specific deliverable of this project and are available from the project web site at: [http://www.academy.gcal.ac.uk/cd-lor/documents/CDLOR\\_Final\\_Recommendations\\_v1p0\\_000.pdf](http://www.academy.gcal.ac.uk/cd-lor/documents/CDLOR_Final_Recommendations_v1p0_000.pdf)

These recommendations are stated briefly below (for more detail, refer to the original recommendations document):

## **(1) Recommendations for Future Development**

### ***Recommendations related to integration of user needs***

- 1.1. LORs should be based firmly on the needs and context of the end user communities that the LORs aim to serve.
- 1.2. LORs should be developed by multidisciplinary teams.
- 1.3. Impact and added value of using LORs must be demonstrated to users.
- 1.4. Examples of successful use of LORs should be collected and made available to users.

### ***Recommendations related to new functions that LORs could serve***

- 1.5. LORs could play a useful role in supporting collaboration on development of resources (among expert resource developers as well as individual users) rather than only being used to store completed resources.
- 1.6. Repositories should be used to clarify copyrights and usage of content.
- 1.7. LORs should be web 2.0-enabled.

### ***Recommendations related to alignment of LORs with existing systems, tools and strategies***

- 1.8. Product innovation should involve process innovation
- 1.9. Integration of LORs with existing tools and systems used in the communities.
- 1.10. LORs linked to organisational strategy and objectives.

### ***Recommendations related to user development and support***

- 1.11. User development and support in information literacy.
- 1.12. Provide appropriate user support strategy.

### ***Recommendations related to vision for funding and integration of CDLOR findings with other JISC initiatives***

- 1.13. Pedagogy pull vs. technology push.
- 1.14. Funding initiatives to target the developments with a pedagogic vision rather than technology-driven developments.
- 1.15. Integrate CD-LOR findings with other JISC initiatives.

## **(2) Recommendations for Further Research**

- 2.1. Development, implementation and (longitudinal) evaluation of Use Cases.
- 2.2. Institutional knowledge management strategies and practices related to LORs,
- 2.3. The Structured Guidelines for Setting Up LORs should be tested and validated
- 2.4. Investigation of the robustness of the repository and community framework of dimensions proposed.