

Community Dimensions of Learning Object Repositories



Deliverable 9 **Structured Guidelines for Setting up** **Learning Object Repositories**

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Table of Contents

Introduction	3
Section 1. General considerations	3
1.1. Background.....	3
1.2. Key dimensions of communities and repositories.....	4
1.3. Defining our terms	4
1.4. Repositories	5
Section 2. Setting up LORs: Understanding your communities	6
Question 1. Why are you setting up a learning object repository? [R-Purpose]	6
Question 2. How many communities do you serve? [C-Composition]	7
Question 3. What is the purpose of the community that the repository will serve? [C-Purpose]...	11
Question 4. Who are the key actors in the community and who, of these, will contribute to the repository? [C-Roles and R-Contributors].....	12
Question 5. What is the pedagogic approach of the community? [C-Pedagogy].....	12
Question 6. How coherent is the community? [C-Coherence]	13
Question 7. What are the modes of participation and communication within the community? [C-Dialogue].....	13
Question 8. What is the ecology of the community? [C-Context].....	14
Question 9. What is the business model of the repository? [R-Business model]	14
Question 10. How do you envision the evolution of your LOR?	15
Further reading	16
On key dimensions of repository and community	16
On iterative design models (Question 1).....	16
On key factors in adoption of innovations (Question 2.1)	16
On cross-sector and cross-disciplinary differences in sharing of resources (Questions 2.2 & 2.3)	17

Introduction

This document outlines guidelines for those wishing to set up and/or evaluate Learning Object Repositories (LORs). The document is written mainly for curators of LORs - repository managers, librarians and all individuals who are responsible for planning, carrying out and managing the design, development and implementation of a learning object repository. The guidelines will also be of interest to middle and senior managers in institutions of higher and further education.

The guidelines pertain to institutional, regional, national and international multidisciplinary and single discipline-based LORs. The guidelines are based on the findings of the "Community Dimensions of Learning Object Repositories" (CDLOR) project.¹ The CDLOR project is funded by the UK JISC² to identify and analyse the barriers and enablers that influence implementation and use of learning object repositories (LORs) within a range of learning communities.

The document consists of two sections:

- **Section 1** sets the scene by describing the rationale underlying the guidelines, and outlining general issues and dimensions to consider when making a decision about setting up a LOR.
- **Section 2** provides guidance on key factors to be considered in the early stages of setting up a LOR, as well as explores potential issues and proposes possible solutions to those issues.

Section 1. General considerations

This section begins by describing the rationale and motivation underlying the guidelines. Dimensions and factors critical for implementation of LORs are outlined and key terms used throughout the document are defined, along with a short list of the repositories used as exemplars.

1.1. Background

Learning Object Repositories (LORs) are a recent technological innovation aimed at supporting sharing and reuse of resources for teaching and learning. They are digital store boxes that host collections of digital resources in a learning object format: i.e. resources that are designed to be integrated, aggregated, and sequenced in an efficient way to produce "units of learning" that are meaningful to learners. Resources in such repositories are collected on a personal, departmental, institutional, national, regional, or international basis.

The uptake of repositories, however, has not been straightforward. Development of LORs, as with many other learning technology innovations, often seem to be driven by exploiting the potential of database technology itself rather than by the learning needs and socio-cultural contexts of the communities which they aim to serve. As a result, the pedagogical, social, and organisational aspects of these communities have not been at the forefront in the design and development of LORs. Research has consistently demonstrated that the most substantial barriers in uptake of technology are rooted in these factors. The aim of the guidelines is, therefore, to support systematic analysis and identification of such factors and issues in the design and development stage and guide future implementations.

The hypothesis underlying these guidelines is that issues that are likely to impact upon the successful uptake and functioning of a LOR are directly related to key dimensions of the community or communities it aims to serve, as well as key dimensions of the repository itself. These dimensions are outlined in the next section.

¹ CDLOR project <http://academy.qcal.ac.uk/cd-lor/>

² JISC, UK Joint Information Systems Committee <http://www.jisc.ac.uk/>

1.2. Key dimensions of communities and repositories

The issues that inhibit sharing and reuse of learning resources will differ across communities, although some will also be common across those communities. This means that some key factors that influence LO repository utilization will differ between one community and another. Other issues may be generic across learning communities, and across the wider repository space (ePrint archives, image databases, research databanks, and so on).

The following dimensions will have implications on the sharing of resources and in the use of LORs within communities³ (short versions in parenthesis include an indication of the type of dimension, i.e. community dimensions (C)):

- (1) **Purpose**, the shared goal/interest of the community; the reason why the community was formed in the first place (C-Purpose)
- (2) **Composition**, the number and types of (sub-)communities to be supported (C-Composition)
- (3) **Dialogue**, modes of participation and communication (online, face-to-face, or mixed) adopted by the community (C-Dialogue)
- (4) **Roles and responsibilities** (C-Roles)
- (5) **Coherence**, whether the community is close-knit or loosely confederated/transient (C-Coherence)
- (6) **Context**, the broader ecology within which the community exists (for example, professional bodies; governments; implicit and explicit rules that govern the functioning of community; ground rules of conduct; rewards and incentives mechanisms; etc.) (C-Context)
- (7) **Pedagogy**, teaching and learning approaches used in the community (for example, problem-based learning, collaborative learning, etc.) (C-Pedagogy)

In addition, the use of LORs within communities is likely to be influenced by a range of dimensions of the LORs themselves (short versions in the parenthesis include the indication of the type of dimension, i.e. repository dimension (R)):

- (1) **Purpose**, including LORs created to support professional development of teachers, or LORs for the exchange of specific resource formats, such as sound files, learning designs, or student assignments (R-Purpose)
- (2) **Subject discipline**, including LORs created to support mono-disciplinary or multidisciplinary communities (R-Discipline)
- (3) **Scope**, including LORs supporting departmental, institutional, regional, national, or international communities (R-Scope)
- (4) **Sector**, for example school, higher education, further education, hobby-based learning, work-based, or lifelong learning (R-Sector)
- (5) **Contributors**, such as teachers, students, publishers, institutions, and hobby enthusiasts (R-Contributors)
- (6) **Business model** concerning the business, trading, and management framework underpinning the repository (R-Business Model)

1.3. Defining our terms

LORs: Different LORs and communities will have their own definitions of what constitutes a useful 'chunk' of teaching and learning material, including anything from simple assets like images, formal LOs and aggregations of those, to more complex interactive resources, learning activity designs, exemplars and case studies. The term "LOR" used in this document is intended only as useful shorthand for organised collections of digital teaching and learning materials.

Curator: By this we mean individuals and teams who plan, carry out and manage the design, development and implementation of LORs, for example repository managers, librarians, information scientists, learning technologists, etc.

³ Margaryan, Currier, Littlejohn, & Nicol (2006)

Community: There are diverse and wide-ranging types and definitions of communities (ibid). In this document, generally, by “community” we mean a group of individuals who have some shared goal related to teaching and learning and who are either currently using a LOR or might do so in the future. In CD-LOR’s terms then, it is useful to distinguish between a core group of *end users* (whether actual or potential) and the wider community of *stakeholders or actors*. Both of these groups can include teachers, students, support staff and managers. For example, in the case of Jorum⁴, a UK national multidisciplinary repository, the community involves all of UK higher and further education. In the case of SIESWE Learning Exchange⁵, a national single-discipline focused repository, the community is currently the Scottish social work education community. In the case of LORE⁶, an institutional multidisciplinary repository, the community is intended to be the entire staff of the Edinburgh University. In some cases such communities will already exist prior to introduction of a repository; in other cases, repositories will be developed with a hope that a community will coalesce around it⁷.

1.4. Repositories

The following repositories are used as exemplars in the rest of this document:

- **JORUM:** Jorum is a UK national, multidisciplinary repository that aims to support communities in both higher and further education. (<http://www.jorum.ac.uk/>).
- **SIESWE LE:** (Scottish Institute for Excellence in Social Work – Learning Exchange) SIESWE LE is a UK national cross-sector repository focused on social work and care. (<http://www.sieswe.org/learnx>)
- **LORE:** Learning Object Repository for Edinburgh University (<http://www.lore.ed.ac.uk/>). LORE is an institutional multidisciplinary repository based at the University of Edinburgh.
- **NDLR:** The National Digital Learning Repository is an Irish national, multidisciplinary repository (<http://www.ndlr.ie/>).
- **MERLOT:** Multimedia Educational Resource for Learning and Online Teaching. MERLOT is an international multidisciplinary repository. (<http://www.merlot.org/>)
- **IVIMEDS:** The International Virtual Medical School (IVIMEDS) is an international, higher-education repository, focused on medicine. (<http://www.ivimeds.org/>)
- **DIDET:** Digital Libraries for Global Distributed Innovative Design, Education and Teamwork. DIDET is a repository system used to support engineering students’ group design projects at the University of Strathclyde (UK) and Stanford University (USA). (<http://www.didet.ac.uk/>)

⁴ JORUM: <http://www.jorum.ac.uk/>

⁵ SIESWE-LE (Scottish Institute for Excellence in Social Work Education – Learning Exchange <http://www.sieswe.org/learnx/>)

⁶ <http://www.lore.ed.ac.uk/>

⁷ Koper, Pannekeet, Hendriks, and Hummel (2004)

Section 2. Setting up LORs: Understanding your communities

This section provides guidance on key factors that should be considered when setting up a LOR and outlines potential issues and possible solutions to those issues.

In the previous section, we described 13 dimensions (seven dimensions of communities and six dimensions of repositories) that can impact uptake and effective use of LORs by communities. How then do you go about analysing your LOR and communities in terms of these dimensions?

You could start by defining the scope of your repository and collecting information from the community or communities that your LOR aims to serve about your end users' current practices and needs in relation to LORs. The ten questions outlined in this section will guide you through this analysis in a systematic way.⁸ While answering some of the questions will be rather straightforward, other responses might require substantial data collection from your communities. Therefore, the discussion of the questions, where applicable, includes suggestions as to how you could go about finding out the answers, for example what stakeholders to involve, what evidence collection methods to use.

The likelihood of adoption of your repository will be increased if the repository is designed and developed by a multidisciplinary team comprised of learning designers, teachers/subject-matter experts, information specialists, and learning technologists. Rapid prototyping and iterative design models⁹, based on thorough user needs analysis and involvement of users at each stage of design, development, implementation and evaluation of LOR will ensure that community needs are met.

Question 1. Why are you setting up a learning object repository? [R-Purpose]

There are a range of reasons for setting up a LOR. You might want to facilitate sharing and reuse of resources across disciplines within a university or college or across HE and/or FE sectors regionally, nationally or internationally. You might want your collection to include one particular type of resources, for example, images, audio or video files, or a range of types of resources, such as a combination of text files, PowerPoint slides, web pages, data sets, video files and so on. Institutional repositories could provide benefits in terms of knowledge capital management and reuse of resources, whilst a national initiative could aim to generate knowledge capital creation for the nation and contribute to reuse commitment. Disciplinary repositories might aim to create a coherent space for sharing of discipline specific resources. Yet another –overarching – reason to set up a LOR could be to enable a critical mass of like minded practitioners to coalesce.

Whatever your purpose and vision, it is important to remember that learning and teaching processes that your LOR aims to support always take place within a complicated mix of personal, social, organisational and cultural contexts. Research has shown that the utility of a LOR will eventually depend not on its technological sophistication, but on the local context of the end users. Therefore any decision to set up a LOR must be based on understanding needs of users, as well as the processes by which they make decisions about adopting technology.

Thus a crucial question to consider is: *What is the problem to which the repository is a solution? And who identifies this as a problem: your potential community (teachers, students, support staff or anyone other end user of your repository); you as a curator or institutional manager; or funder?* If the repository is mismatched with your users' needs, misaligned with institutional strategies and policies, ignores cultural, pedagogic and organisational context of your users, it is inevitable that its uptake will be poor. The purpose of these guidelines is to help you increase the likelihood of adoption of your repository by ensuring that your community needs and context are met.

⁸ Note that relevant repository (R) or community (C) dimensions outlined in Section 1 are given in square brackets after each question.

⁹ For references on these models, see Further Reading section at the end of this document.

A related question to consider at this point is: *What is the measure of success of your LOR?* It is important to identify the criteria for success in this early stage. What you define as success will, of course, depend on the type of repository and the type of community you aim to serve. It is rather common to define the success of technological tools by simplistic measures such as user satisfaction; number of users; number of contributed and downloaded resources. However, such measures do not really tell anything about the impact of your repository on teaching and learning. Examples of more useful criteria (although undoubtedly more complex and difficult to measure) are improved dialogue and productivity across the community or improved learning outcomes. By defining your impact-oriented measures of success early on, you can have some principles to help you develop the resources, avoid scope-creep, and manage conflicting priorities.

Question 2. How many communities do you serve? [C-Composition]

To analyse the needs and context of your users, begin by identifying the number and types of communities that your repository will support. Depending on the type and scope of your repository, your communities might be academics and students in a *single institution*, *subject area* within an institution or across a range of institutions *regionally*, *nationally* or *internationally*. Simplistically, a repository may be seen to serve a single community, its users. In practice, the user group is likely to be comprised of a number of communities. For instance, the repository may be multidisciplinary and the user community may actually be formed from a number of autonomous communities. Even in single discipline repositories, there are likely to be small sub-communities of experts or power users who may contribute most of the resources.

For example, National Digital Learning Repository (NDLR)¹⁰ in Ireland at present identifies 10 main communities that it aims to support, all of which are discipline-based. These communities existed and were sharing resources on an informal basis before the repository was introduced. NDLR has been launched to these various communities in a gradual fashion. The order in which communities have been introduced has been determined by consideration of which of the communities were more established and have actively volunteered to be a part of the repository initiative.

In contrast, Jorum¹¹, a national repository in the UK, identifies its communities around four categories which are not discipline-based. These are: 1) users (who source resources); 2) contributors (JISC-funded projects, lodging content as a condition of their funding); 3) contributors in institutions subscribed to Jorum; and 4) intermediaries (for example, learning resource centre managers, educational developers, and other support staff). Of these communities, for example, contributors (for example, people working on JISC-funded projects) already existed and collaborated regularly through cluster meetings before the repository was introduced. Similarly, many intermediaries, such as Learning Resource Center Managers, meet regularly through various local initiatives.

These examples are focused on *learning-orientated communities* and *work-oriented communities* (*communities of practice*). Other broad categories of communities include *research-oriented communities* (in academia and industry) and *hobby-oriented communities* (for example, communities of fantasy/gaming). There are relevant factors for LORs to be found within all of these types. For example, there are very successful hobby-oriented communities sharing resources, such as Flickr¹² and open source software development communities from which lessons can be drawn.

Let us explore your target community in detail. If your repository aims to serve more than one community, answer questions 2.1 to 2.4 for each of the communities.

Question 2.1. Does your community exist?

Sometimes your repository will be set up with a view that a community will coalesce around it. You should not, however, assume that this will necessarily happen once your repository is available. You might need to plan specific activities in order to enable acceptance and adoption of your repository. For example, SIESWE Learning Exchange, a UK national repository for social work, is trying to

¹⁰ NDLR <http://www.ndlr.ie/>

¹¹ Jorum <http://www.jorum.ac.uk/>

¹² Flickr <http://www.flickr.com/>

develop a number of communities none of which either existed or were active as communities sharing resources through a repository. One potential community is educators in social work and care. SIESWE LE team wish to encourage the dissemination of best practice through this community regarding the use of resources found in the repository. Other potential communities are focused on legislation; a work-based community focussed on continuing professional development (CPD); a research-oriented community, as well as other special interest groups. SIESWE LE hired a person whose role it is specifically to help generate and grow these communities.

MERLOT¹³, an international (US-Canada based) repository of teaching materials, is an example of a repository which has grown organically over a long period. MERLOT was founded at California State University in 1997 and evolved into a co-operative venture soon after involving The University of Georgia System, Oklahoma State Regents for Higher Education, and the University of North Carolina System. It was originally modelled on the Educational Object Economy initiative (Apple Corp.) and was a multidisciplinary, single-institution based initiative. By 2000, significant sums were pledged by the four partner institutions and funding was used to develop evaluation standards and a comprehensive peer review processes. Other partners (academic institutions, professional bodies and corporations) have joined in the intervening years. Download of materials is open to all, but participation in the MERLOT community and uploading materials is restricted to registered members. The sign-up process is simple, with only basic information required for registration. Your core discipline is recorded (and used to target information and content to you). Once registered, you can create a rich profile describing your experience, positions, affiliations, publications, honours, awards, etc. Rich information about participants in the community is deemed an important element, and the member directory is a central element of the MERLOT site. Individuals accumulate points for peer reviewing and achieve gold, silver and bronze starred reputations similar to those gained with eBay. MERLOT's communities may have existed before the repository was introduced, but MERLOT has provided a single locus to allow them to reach a critical mass where the repository becomes a useful place to go to look for materials and expertise or advice. Barriers to entry are low, so the community should be representative of the sector, though it will obviously be attractive mainly to those who are interested in using electronic resources in their teaching. The annual MERLOT conference and the MERLOT Journal (JOLT – Journal of Online Learning and Teaching) are two other initiatives aimed at facilitating community formation and coherence.

Whether your community already exists or is expected to coalesce around the repository, it is important that explicit implementation and innovation management strategies are planned in the early stages of LOR development. Research has shown¹⁴ that the following factors are critical for adoption of technological innovations:

- *Relative advantage* – your potential users need to see an advantage for using the LOR over tools and processes that they are currently using
- *Compatibility* – LORs must fit in with potential users' current practice and values
- *Complexity* – ease of use of LOR will lead to more rapid adoption. This involves user-friendly interface, usable features, and user-oriented processes for search, retrieval, contribution, and so on.
- *Trialability* – potential users will want to be able to test your LOR for some time before making decision whether to adopt or not. For example, you might want to enable them to view resources in the repository without them having to subscribe.
- *Observability* – potential users will want to see observable results of what repositories can do for them in their specific area/job. This can be provided through exemplars or case studies of successful use of LORs in teaching and learning. These exemplars could be made available either through LORs or through workshops and training sessions. Such exemplars should clearly demonstrate how a LOR adds value in particular contexts (preferably similar to your potential users' context)

Research has also indicated that in their acceptance of innovation people move through several stages; and to promote new practices, a strategy that corresponds to the stage where people are in is needed. Dormant (1997)¹⁵ outlines the following stages of acceptance of innovation and suggests strategies for each of these stages (Table 1):

¹³ MERLOT: Multimedia Educational Resource for Learning and Online Teaching: <http://www.merlot.org/>

¹⁴ Rogers (2003)

¹⁵ Dormant (1997)

If the person is in the stage of...	Then the strategy to use is to...
Awareness <ul style="list-style-type: none"> <input type="checkbox"/> Passive regarding the change <input type="checkbox"/> Little/no information about change <input type="checkbox"/> Little/no opinion about change 	Advertise <ul style="list-style-type: none"> <input type="checkbox"/> Be an ad agent <input type="checkbox"/> Be credible and positive <input type="checkbox"/> Appeal to his or her needs and wants
Curiosity <ul style="list-style-type: none"> <input type="checkbox"/> More active regarding change <input type="checkbox"/> Expresses personal job concerns <input type="checkbox"/> Asks questions about own work and change 	Inform <ul style="list-style-type: none"> <input type="checkbox"/> Identify specific concerns <input type="checkbox"/> Provide clear info about concerns <input type="checkbox"/> Emphasize pluses, acknowledge minuses
Envisioning <ul style="list-style-type: none"> <input type="checkbox"/> Active regarding change <input type="checkbox"/> Expresses work-related job concerns <input type="checkbox"/> Asks questions about how change works 	Demonstrate <ul style="list-style-type: none"> <input type="checkbox"/> Give success images <input type="checkbox"/> Provide demonstrations <input type="checkbox"/> Connect with peer users
Tryout <ul style="list-style-type: none"> <input type="checkbox"/> Active regarding change <input type="checkbox"/> Has opinions about change <input type="checkbox"/> Interested in learning how-to 	Train <ul style="list-style-type: none"> <input type="checkbox"/> Provide effective training <input type="checkbox"/> Provide job aids, check lists <input type="checkbox"/> Promise technical follow-up
Use <ul style="list-style-type: none"> <input type="checkbox"/> Active regarding change <input type="checkbox"/> Uses change on the job <input type="checkbox"/> Asks detailed questions about use 	Support <ul style="list-style-type: none"> <input type="checkbox"/> Provide necessary technical help <input type="checkbox"/> Provide reinforcement <input type="checkbox"/> Provide recognition

Table 1. Strategies to enable acceptance of innovations (Dormant, 1997, p. 144)

This means that if you want to promote your repository, you shouldn't necessarily focus on training, which is one strategy that is often misapplied in change initiatives. If potential users and communities are at the awareness stage, there will be little value in pushing them to use the repository or provide demonstration or make training available. Such strategies could even be counter-productive. Make sure that you understand clearly what level your potential users are at and then choose the appropriate strategy to support them.

Question 2.2. What educational sector does the community operate within? [R-Sector]

In analysing your community/communities, educational sector within which the community operates is an important dimension that will have impact on the adoption of your repository. Your LOR might target a range of educational sectors, for example, *school, higher education, further education*. Communities based in different educational sectors are likely to have different needs. For example, the school and further education sectors are based around standardised curricula. Therefore, teachers from these sectors may be more likely to reuse larger/aggregated sections of material that are based on a number of learning outcomes¹⁶. In contrast, in higher education, the non-standardised curriculum has often been identified as a barrier to sharing and reuse of resources. Another key barrier to adoption of repositories for teaching and learning in higher education is the tension between the perceived high status of research and (lower) status of teaching. Institutional rewards for academics often depend on their research outputs (measured by publications in high impact-rated peer-reviewed journals) rather than teaching activities. Consequently, teachers may be unwilling to invest time in adopting new teaching methods and technologies such as learning object repositories, since they are seldom rewarded or recognised for introducing innovative approaches to their courses. Therefore, it is important that your decision to set up a repository is based on a careful consideration of the implications of these differences and strategies to tackle potential issues that might arise.

Question 2.3. What is the subject discipline of the community? [R-Discipline]

A LOR may aim to support communities based either in a specific discipline or a range of disciplines. For example, SIESWE LE is a UK national cross-sector repository focused on social work and care. Similarly, IVIMEDS¹⁷ is an international, higher-education repository, focused on medicine. In

¹⁶ Littlejohn, Jung, and Broumley (2003)

¹⁷ IVIMEDS, www.ivimeds.org

contrast, Jorum is a UK national, multidisciplinary repository that aims to support communities in both higher and further education.

Research has shown that subject area is among the major variables that can impact the potential for sharing and reuse¹⁸. Some disciplines may be more successful than others in reuse. Patterns of technology use may vary across different disciplines¹⁹. For example, in a CDLOR study investigating issues underlying use of repositories²⁰, SIESWE LE curators argued that social work was a largely “non-techie” discipline, and that there was resistance to students using the LOR directly. Disciplines may also differ in terms of the key curriculum outcomes and preferred pedagogic approaches²¹. Subsequently, types of resources different discipline communities are likely to want to reuse may vary²².

In addition, discipline-specific teaching and learning models as well as the types of knowledge these disciplines work with can impact utilisation of LORs^{23 24}. For example, it has been argued that scientists and engineers are more comfortable with the concept of digital learning objects than academics from the humanities. Discipline-specific traditions regarding modes of collaboration and communication is a key factor that could influence utilisation of LORs²⁵. Although much more research is needed to unpick disciplinary differences underlying sharing and reuse of resources, we recommend that you consider how this dimension can impact the ways your particular communities could be using the repository.

Question 2.4. What is the scope of the community? [R-Scope]

Communities range from classroom-based, institutional and regional to national and international. Communities may find it useful to share some resources with colleagues or learners locally (within institutional or classroom-based communities), while they may wish to share other resources more widely (nationally or internationally). The scope of communities may have implications for the coherence of communities, the ways the members communicate and interact, and for user support and training.

For example, IVIMEDS, which involves medical communities in 26 different institutions of higher education around the world, operates in a global context of many different curricula. They had to agree a common taxonomy based on these diverse curricula. For Jorum, operating on a national scale presents challenges in terms of rolling out user support and training approaches nationally. Jorum aims to capitalise commonalities and communities that exist nationally, such as peer groups, subject centres, funding streams, and so on. For repositories operating on a national or international scale, further challenges could involve getting various institutions, each with different cultures and traditions, to collaborate efficiently. One such national repository that faces this challenge is SIESWE LE, which operates across nine institutions of higher education.

Cultural issues are exacerbated when repositories operate in an international context. Culture will have implications for utilisation of LORs by communities. Some relevant dimensions include, for example, diverse cultural models and expectations in terms of learning and sharing; cultural expectations in terms of collaboration, interaction, and hierarchies; community size, member proximity, and types of tasks for which LORs are used; language and visual aspects of LOR user interfaces; infrastructure, access and technology skill differences; expectations in terms of roles within communities (e.g. learner and teacher roles); human-computer interaction and tolerance of new technology. For a more detailed discussion of cross-cultural issues see Margaryan et al. (2006).

Repositories serving local communities (classroom- department- or institution-based communities, where members are geographically close and already know each other and frequently meet face to face) will be used differently from those with regional, national, or international scope. Some initial findings related to current practice indicate that, when developing educational materials, teachers

¹⁸ Russell (2005)

¹⁹ Cook (2006)

²⁰ Margaryan, Currier, Littlejohn, and Nicol (2006)

²¹ HEA (2006)

²² Masterman and Lee (2005)

²³ Becher and Trowler (2001)

²⁴ Meyer and Land (2006)

²⁵ McGill, Nicol, Littlejohn, Grierson, Juster, and Ion (2005)

prefer to share resources with colleagues locally^{26 27}. Therefore, national repositories may experience more problems in encouraging users to contribute resources than classroom-based or institutional ones.

Once you have considered these questions for your particular community or communities, think further about their specific characteristics. If your repository aims to serve more than one community, answer questions 3 to 8 for each of the communities. Answering these questions will most probably require some form of systematic scoping of your community. This could be carried out via a survey (questionnaire or interview-based) of a representative sample of target community members. It is important to ensure that the key groups of stakeholders and users are involved in the design and evaluation process in order to use their expertise and maximise the meaningfulness and practicality of the repository for them.

Question 3. What is the purpose of the community that the repository will serve? [C-Purpose]

Think about the purpose of the community *beyond its use of the repository*. The purpose of a community is its shared goal or interest, the reason why the community was formed and why it exists. Understanding the background of the community is essential in developing strategies for promoting your repository. To this end, you might want to consider investigating the following questions:

- *Has the community existed before the LOR was introduced, or does the repository aim to bring a new community together?*
- *If the community already existed, what brought it together and what were the main stages in its evolution?*
- *If the community has evolved around the repository from a larger community (for example, an educational sector), is the community representative? Are potential members not participating (for example, a repository which hasn't yet matured into serving the whole sector but instead supports only funded partners)?*

In case of a pre-existing community, the original purpose of the community will most probably be broader than sharing and reusing resources. For example, the DIDET project²⁸ produced a repository system used to support engineering students' group design projects at the University of Strathclyde (UK) and Stanford University (USA). DIDET, which can be considered as an example of a classroom-based repository, is used as a support tool in a product design course in the Department of Design, Manufacture, and Engineering Management. The community that this repository aims to facilitate is comprised of the students and tutors in the course. The original purpose of this community, which existed before the repository was introduced, is to learn (and teach) about product design principles through carrying out group design projects. With regard to the repository, the purpose of the community is to source, create and share materials to support these design projects.

Once you have identified the original purpose and goals of the community, consider finding out what typical activities the community carries out in order to achieve its goals, and which of these activities your repository will support. Consider also how the introduction of the repository can impact the activities of the community. For example, how will the repository fit with the established patterns and ways of "doing things" within the community? Will introduction of repository shift these patterns and goals and will it perhaps necessitate new types of activities?

For example, a community that provides mutual support for skills development is unlikely to want a strong emphasis on quality assurance in the process of sharing resource via the repository, as that might create barriers to openness. On the other hand, a community focussed on expert knowledge sharing might be able to support a thriving peer review and rating system, furthering its goals of being a focus for excellence.

²⁶ Margaryan (2006)

²⁷ Strijker (2004)

²⁸ DIDET: Digital Libraries for Global Distributed Innovative Design, Education and Teamwork <http://www.didet.ac.uk/>

Question 4. Who are the key actors in the community and who, of these, will contribute to the repository? [C-Roles and R-Contributors]

The next question to explore is: Who are the main actors in the community and what are their roles and responsibilities? A teaching and learning community will include a wide range of actors, such as teachers, researchers, content experts (other than teachers of researchers), students, learning technologists, educational developers, institutional middle and senior managers, support staff, etc. We recommend that you find out how these actors interact and what their respective roles are with regards to the activities and goals of the community, identified in the previous question.

Once these questions have been addressed, consider how the introduction of the repository might impact distribution of roles. How will the repository fit with the existing hierarchies, relationships, and roles? Will the roles have to be reshaped? Will there be a need to introduce new, perhaps formal, roles for contributing to the repository?

Of the wide range of community members, some will contribute to the LOR directly. The roles these contributors can fulfil are different. Content experts may be subject-matter experts designated to create resources, or they may be the teachers themselves (this is normally the case in higher education context). Content experts may or may not have knowledge or skills around pedagogy and pedagogic design, which can be a critical factor in terms of utilisation of resources they create. Support staff can include designers who create or assemble resources; or librarians who are responsible for general management of resources. Institutional managers are also key community members as they are policy makers (even if they don't directly contribute or utilise resources). Their role in uptake and use of repositories is crucial in that it is they who make the strategic decisions about reuse policies, procedures, staff, finance, and infrastructure, copyright and intellectual property policies, rights and privileges, and so on. Finally, students are end-users, and they can also create resources jointly with their peers and teachers. A major issue could be their skills in appraisal of quality and relevance of the resources that they find, reuse or create. Also, disciplinary, institutional and cultural contexts will differ in terms of tolerance of students selecting or creating their own resources.

For example, in the case of DIDET, contributors to the repository are the students and tutors in the Product Design course, as well as industry-based coaches, who define the project brief and give feedback to students. These three groups of actors comprise the original community that the DIDET repository aims to facilitate. However, the introduction of the repository necessitated involvement of another actor - information specialists, who provide guidance and skills training in resource management, and who also maintain the digital learning environment. Of these four groups, however, only three - students, tutors and information specialists - contribute directly to the repository.

In the case of Jorum, the communities that this repository aims to support - all of the UK Higher and Further Education as well as the JISC-funded projects - are broad and involve a multitude of actors. Direct contributors to the repository are grouped within two interrelated services. The "Jorum Contributor" service requires each participating institution or JISC-funded project to nominate individuals to act as "contributors" (this is often a small group of staff). The role of the contributors is to gather and upload resources from colleagues across their institution. The "Jorum User" service provides tutors from all UK institutions access to all gathered resources. Users can source, preview, download, repurpose, and reuse materials within their teaching context. Jorum curators are another key actor, in that they provide training and technical support, as well as general curatorial services.

Question 5. What is the pedagogic approach of the community? [C-Pedagogy]

Pedagogic approaches used within the community are a major factor that could impact uptake and use of repository. For example, pedagogic approaches utilised by communities can have implications for the types of resources that the communities are likely to want to create, share, and reuse. For example, if teaching methods within a community are predominately centred on problem-based or

case-based learning, there may be a need to find problem scenarios and case studies and to share group activities around these. For example, social work education has been identified as a discipline which is strongly focused on problem-based learning with extensive emphasis on reflective practice and making extensive use of case studies (Margaryan et al, 2006, pp. 30-35). So in the case of SIESWE LE, which aims to support social work communities nationally, these types of resources might potentially be more readily shared and reused.

So in analysing pedagogic approaches predominant in the community that your repository aims to serve and how these approaches are likely to impact the community's use of the LOR, the following question must be answered: What pedagogic approaches and teaching methods are primarily used within the community? We recommend that you then consider how the introduction of the repository will impact these pedagogies or how the pedagogies are likely to impact the repository.

Question 6. How coherent is the community? [C-Coherence]

Coherence of the community can be viewed on a scale from being close-knit to being transient and loosely confederated. Geographically-dispersed communities are often loosely knit. In such communities, members will communicate and interact in different ways as compared with locally-based, tightly knit communities. Related to this, geographically-dispersed communities are likely to comprise culturally diverse users. These different factors will have implications for the sharing of resources and in the use of LORs within communities.

For example, communities served by classroom-based (such as DIDET) or institutional (such as LORE) repositories will often be more closely knit than communities served by national or international repositories, such as NDLR, Jorum or IVIMEDS. In the case of MERLOT, the community can be said to be loosely established, but those who use the repository consistently are likely to develop relationships through the repository itself (always using resources created by another user because they trust the content or know that the content is ideally suited to the curriculum they teach) or through other forms of participation in the community such as those afforded by the MERLOT annual conference. The use of sub-communities in MERLOT also promotes a sense of belonging to a community of educators with shared interests.

Question 7. What are the modes of participation and communication within the community? [C-Dialogue]

The forms of dialogue existing within the community are another key variable that could influence the ways in which communities use repositories. Modes of communication can be broadly categorised as face-to-face, online, or mixed mode. Community members might use a range of tools to facilitate dialogue – for example, e-mail, telephone, online discussion fora, blogs, wikis, and so on. Which modes of communication and communication tools are being used will be impacted by the spatial location of community members as well as their skills and comfort in using ICT (Information and Communications Technologies).

In analysing modes of dialogue within your particular community, the following questions could be helpful: 1) What are the main modes of communication in the community? 2) What are the modes of participation, for example how often do community members meet and interact? 3) What electronic tools do they use to support these interactions? Based on the information you get from your community, you could then consider how the repository will fit with these established modes of communication and participation within the community; and whether these will have to be reconfigured when the repository is introduced.

Communities served by institutional and classroom-based repositories are likely to interact more often, more closely and face-to-face. In the case of communities coalescing around repositories, dialogue may often be non-existent in the early stages. Different repositories employ different methods of encouraging dialogue. For example, MERLOT's community is online, and international. MERLOT provides an opportunity for face-to-face contact through the international conference and encourages collaboration through the adoption of a social structure. Although there is little 'social' conversation, there is evidence of relationships which have developed around shared educational

interests, and the use of reputation, along with comments and peer review ensures that there is both a social structure and opportunity for communication at different levels. In the case of the IVIMEDS, the collaboration around resource development is happening through phone conferences and e-mails. In the case of the Jorum, repository community dialogue is facilitated through periodic face-to-face programme meetings with follow-up discussions taking place through e-mail. Jorum also maintain a mailing list and regularly run conferences, workshops and training events for their actual and potential users.

Question 8. What is the ecology of the community? [C-Context]

Use of repositories might be influenced by the broader context within which the community operates. There may be a range of external stakeholders each introducing implicit and explicit rules that govern the functioning of community. External stakeholders might include, for example, various professional bodies, governments and institutions. We recommend that you investigate which particular factors are critical for your particular community, and consider potential implications of these stakeholders' regulations and policies with respect to utilisation of repository.

Among explicit and implicit rules that could have implications for use of repositories by communities are ground rules of conduct adopted by community members; rewards and incentive mechanisms for participation in the community; hierarchies and control of access and use of community resources; curricula and disciplinary frameworks; institutional strategies for teaching and learning, and policies for ICT support. All of these factors will have implications for the uptake and use of repositories.

For example, SIESWE LE is planning to expand internationally. However, relevant legislation related to social work varies from country to country, so this will have to be considered before making a decision to expand. The rules are still to be established, in consultation with potential communities. Jorum, which is funded by the JISC, identifies that the important contextual factors for them are IPR (Intellectual Property Rights) and curricular differences across different sectors. In the case of DIDET, rules involve curricular aims and learning objectives (including assessment) of the product design course which it aims to facilitate.

Once you have the answers to questions 1 to 8, you will be more aware of the needs and form of your target community or communities. Let us now consider two further dimensions that impact utilisation of repository by communities. Questions 9 and 10 are aimed at guiding you through this analysis.

Question 9. What is the business model of the repository? [R-Business model]

The business model concerns the trading and management framework underpinning the repository. Repositories can adopt different business models, and they can also differ in terms of micro-economic and macro-organisational aspects. These include risk analysis and management; governance (for example for multi-institutional LORs); financial aspects such as funding, auditing, and accounting; financial models; added value for the stakeholder and user communities; and legal issues. Consideration related to business model could be relevant for communities particularly in formative phases, and when multi-institutional collaboration is involved.

When considering costs of a repository, you might want to take into account costs for needs and community analysis; software development or acquisition/adaptation of existing software; server hosting; staffing costs to support development and implementation of repository; and promotional and training materials. Depending on your business model, there might also be costs around contributor/user time, meta-tagging time and so on. The costs might be met fully or partially by a regional, national or international funder, sponsor, the host institution, or contributors/users themselves (per item or via subscription). Incentives might be financial, or be realised through enhanced reputation, time saved, or skills developed. A cost benefit analysis should focus on sustainability (see Question 10). A repository which is completely reliant on external funding outside

of the user community itself may have sustainability problems. A repository with lower costs, met from within the community, might have a more stable growth.

For example, in the case of Jorum, trading model is particularly critical, and Jorum is currently involved in business planning for the future. In addition, a separate organisation (JISC) or consortium is required to manage the repository and its various aspects such as workflows and digital rights management. Similarly, in the case of SIESWE LE, a trading model (for example tokens, bartering, royalties, or payments) could be essential. It could be argued that altruism might work given the tight-knit nature of some of the communities that SIESWE LE aims to support. In institutional repositories, the trading model is possibly less critical than institutional commitment with rewards and incentives to participate at institutional level. In the case of classroom-based repositories such as DIDET, a trading model is not applicable, but commitment from academic staff and students is necessary, and incentives might be required at departmental level to motivate all relevant staff to participate. In these examples, business models do not appear to be explicitly articulated although they implicitly underpin the repositories.

Question 10. How do you envision the evolution of your LOR?

Finally, it is important to consider how a repository might be affected over time by external factors. LORs exist within a complex landscape and are influenced by a number of factors. Gaining some understanding of what the key influences are and how they may vary over the short and long term can help in anticipating and planning for change.

Over time, a repository will accrue new content. It is important to understand the short and long term implications of this – short-term, this may be a good thing, as the likelihood of a user finding a resource which fits their needs increases. Long-term, however, there may be a danger that too many resources are stored in the repository and that efficient discovery is hampered by poor quality metadata. It may be that your repository has an optimum size and that once it grows beyond that size you will need to facilitate the creation of sub-communities.

It is also important to consider maintenance of the content of a repository over time. For instance, do resources held within the LOR age and become obsolete. If so, then it is important to have put in place some policy to address this need for maintenance. Other factors to consider include the impact of new technologies and other related services. Competition is a key factor. Even in a non-commercial setting, it is possible that another repository will be established which performs much the same role and includes a similar range of resources as yours.

Further reading

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