

# Community Dimensions of Learning Object Repositories



## *Deliverable 9* Structured guidelines for setting up Learning Object Repositories

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### **Authors**

Anoush Margaryan, Colin Milligan and Peter Douglas

**With thanks to Allison Littlejohn, David Nicol, and the CDLOR Partners**

Please send comments to Colin Milligan at [colin.milligan@strath.ac.uk](mailto:colin.milligan@strath.ac.uk)

## Table of Contents

Introduction .....	3
Section 1. General considerations.....	3
1.1. Rationale and motivation .....	3
1.2. Key dimensions of communities and repositories .....	4
1.3. Defining our terms .....	4
Section 2. Setting up LORs: Understanding your communities .....	5
Question 1. Why are you setting up a learning object repository? [R-Purpose] .....	6
Question 2. How many communities do you serve? [C-Composition] .....	6
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].....	11
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

## 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, however it might also be of interest to middle and senior managers in institutions of higher and further education, as well as anyone involved in development and implementation of LORs.

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.<sup>1</sup> The CDLOR project is funded by the UK JISC<sup>2</sup> to identify and analyse the barriers and enablers that influence implementation and use of learning object repositories (LORs) within a range of different learning communities.

The document consists of two sections. Section 1 sets the scene by describing the rationale and research 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.

### 1.1. Rationale and motivation

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. LORs, as many other learning technology innovations, often seem to be driven by exploiting the potential of database technology itself rather than by 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 repository itself. These dimensions are outlined in the next section.

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

<sup>2</sup> 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 learning communities. This means that some key factors that influence LO repository utilization will differ between one community and another. Others may be generic across learning communities, and across the wider repository problem-space (for example, ePrint archives, image databases, research databanks, etc.).

The following dimensions will have implications on the sharing of resources and in the use of LORs within communities<sup>3</sup>:

- (1) *Purpose*, the shared goal/interest of the community; the reason why the community was formed in the first place;
- (2) *Composition*, the number and types of (sub-)communities to be supported
- (3) *Dialogue*, modes of participation and communication (online, face-to-face, or mixed) adopted by the community;
- (4) *Roles and responsibilities*;
- (5) *Coherence*, whether the community is close-knit or loosely confederated/transient
- (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.); and
- (7) *Pedagogy*, teaching and learning approaches used in the community (for example, problem-based learning, collaborative learning, etc.).

In addition, the use of LORs within communities is likely to be influenced by a range of dimensions of the LORs themselves:

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

## 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, through 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.

**Community:** There are diverse and wide-ranging types and definitions of communities available (ibid). In this document, generally, by “community” we mean a group of individuals that have some

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<sup>3</sup> Margaryan, A., Currier, S., Littlejohn, A., & Nicol, D. (2006). *Learning communities and repositories*. CDLOR Deliverable 1. JISC, UK (52 pp.). <http://academy.gcal.ac.uk/cd-lor/learningcommunitiesreport.pdf>

shared goal related to teaching and learning and who are either the actual or potential users of a LOR. 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*. Both of these groups can include teachers, students, support staff and managers. For example, in the case of Jorum<sup>4</sup>, a UK national multidisciplinary repository, the broader community could involve all of UK HE and FE; in case of the SIESWE Learning Exchange<sup>5</sup>, a national single-discipline focused repository, it is currently the Scottish social work education community; in the case of LORE<sup>6</sup>, an institutional multidisciplinary repository, the community is intended to be all the staff of 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 it.

## 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 identified 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 community of communities that your LOR aims to serve, including end users' current practices and needs in relation to LOR. The ten questions outlined in this section might be helpful in guiding you through this analysis.<sup>7</sup>

While answering some of the questions will be rather straightforward, others 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 methods to use to collect evidence.

Overall, adoption of repository could be enhanced if it 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 models<sup>8</sup>, 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.

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<sup>4</sup> <http://www.jorum.ac.uk/>

<sup>5</sup> <http://www.sieswe.org/learnx/>

<sup>6</sup> <http://www.lore.ed.ac.uk/>

<sup>7</sup> Note that relevant repository (R) or community (C) dimensions outlined in section 1 are given in square brackets after each question.

<sup>8</sup> You can find out more about these methods in:

- Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *The Journal of the Learning Sciences*, 13(1), 1-14.
- Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design research: Theoretical and methodological issues. *The Journal of the Learning Sciences*, 13(1), 15-42.
- Reeves, T.C. (2000, April). *Enhancing the worth of instructional technology research through design experiments and other developmental research strategies*. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA, USA.
- Moonen, J. (2001). Design methodology. In H. Adelsberger, B. Collis, & J. Pawlowski (Eds.). *Handbook of information technology for education and training* (pp. 153-180). Berlin: Springer Verlag.
- Prester, G. (2004). *The Use of Traditional Instructional Systems Design Models for eLearning*. Available from <http://www.herridgroup.com/pdfs/The%20use%20of%20Traditional%20ISD%20for%20eLearning.pdf>
- Gustafson, K., & Branch, R. (1997). Revisioning models of instructional development. *Educational Technology Research and Development*, 45(3), 73-89.

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

There might be a range of reasons for setting up an LOR. You might want to facilitate sharing and reuse of resources across disciplines within a university or college; 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 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 of your repository development project? 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 considered when setting up a repository.

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 type of community you aim to serve. It is rather common to define success of technological tools by simplistic measures such as user satisfaction; number of users; number of contributed and downloaded resources. However, these do not indicate impact on teaching and learning. More useful criteria –although undoubtedly more complex and difficult to measure – could be improved dialogue and productivity across the community; improved learning outcomes.

## **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)<sup>9</sup> in Ireland at present identifies 10 main communities that it aims to support, all of which are discipline-based. These communities existed

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<sup>9</sup> NDLR <http://www.ndlr.ie/>

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, Jorum<sup>10</sup>, a national repository in the UK identifies its communities around the four categories of 1) users (who source resources); 2) contributors (JISC<sup>11</sup>-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, the Contributors (i.e. people working on JISC-funded projects) already existed and collaborated regularly through cluster meetings before the repository was introduced.

These examples are focused on *learning-orientated communities*. Other broad categories of communities include *work-orientated communities* (such as communities of practice); *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 some very successful hobby-oriented communities sharing resources such as Flickr<sup>12</sup> and open source software 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<sup>13</sup>, a UK national repository for social work, is trying to 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, and the 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.

MERLOT<sup>14</sup>, 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

<sup>10</sup> Jorum <http://www.jorum.ac.uk/>

<sup>11</sup> JISC, Joint Information Systems Committee of the UK <http://www.jisc.ac.uk/>

<sup>12</sup> Flickr <http://www.flickr.com/>

<sup>13</sup> SIESWE LE <http://www.sieswe.org/>

<sup>14</sup> MERLOT <http://www.merlot.org/merlot/index.htm>

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. Annual MERLOT conference and the MERLOT Journal (JOLT) 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 shown<sup>15</sup> 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 LOR adds value in particular contexts (preferably similar to your potential users' context)

Research 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 is needed. Dormant (1997)<sup>16</sup> outlines the following stages of acceptance of innovation and suggests strategies for each of these stages (Table 1):

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

<b>If the person is in the stage of...</b>	<b>Then the strategy to use is to...</b>
<b>Awareness</b> Passive regarding the change Little/no information about change Little/no opinion about change	<b>Advertise</b> Be an ad agent Be credible and positive Appeal to his or her needs and wants
<b>Curiosity</b> More active regarding change Expresses personal job concerns Asks questions about own work and change	<b>Inform</b> Identify specific concerns Provide clear info about concerns Emphasize pluses, acknowledge minuses
<b>Envisioning</b> Active regarding change Expresses work-related job concerns Asks questions about how change works	<b>Demonstrate</b> Give success images Provide demonstrations Connect with peer users
<b>Tryout</b> Active regarding change Has opinions about change Interested in learning how-to	<b>Train</b> Provide effective training Provide job aids, check lists Promise technical follow-up

<sup>15</sup> Rogers, E. (2003). *Diffusion of innovations*. New York: Free Press.

<sup>16</sup> Dormant, D. (1997) Planning change: past, present, future. In R. Kaufman, S. Thiagarajan, and P. MacGillis (eds.), *The guidebook for performance improvement: working with individuals and organizations*. San Francisco: Pfeiffer.

Use	Support
Active regarding change	Provide necessary technical help
Uses change on the job	Provide reinforcement
Asks detailed questions about use	Provide recognition

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 could be little use 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.

### **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 can 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 outcomes (see discussion in Littlejohn, Jung and Broumley, 2003<sup>17</sup>). In contrast, in higher education, non-standardised curriculum has often been identified as a barrier to sharing and reuse of resources. Another oft-mentioned barrier to reuse in higher education is the focus on research outputs rather than teaching. It is important that your decision to set up a repository is based on careful consideration of the implications of these differences and strategies to tackle the 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, IVIMEDS<sup>18</sup> is an international, higher-education repository, focused on medicine. In 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 reuse (for example, see Russell, 2005<sup>19</sup>). Some disciplines may be more successful than others in reuse. Patterns of technology use may vary across different disciplines (Cook, 2006<sup>20</sup>). For example, in a CDLOR study investigating issues underlying use of repositories<sup>21</sup>, SIESWE LE curators argued that social work was a largely "non-techie", even luddite 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 approaches (HEA, 2006<sup>22</sup>). Subsequently, types of resources different discipline communities are likely to want to reuse may vary (Masterman and Lee, 2005<sup>23</sup>).

<sup>17</sup> Littlejohn, A., Jung, I., & Broumley, L. (2003). A comparison of issues in reuse of resources in schools and colleges. In A. Littlejohn (Ed.), *Reusing online resources: A sustainable approach to e-learning* (212-220). London: Kogan Page.

<sup>18</sup> IVIMEDS, [www.ivimeds.org](http://www.ivimeds.org)

<sup>19</sup> Russell, C. (2005). Disciplinary patterns in adoption of educational technologies. In J. Cook, & D. Whitelock (Eds.), *Exploring the frontiers of e-learning: Borders, outposts, and migration* (pp. 64-76). Proceedings of the ALT-C 2005 Conference, September 6-8, 2006, Manchester, England, UK.

<sup>20</sup> Cook, J. (9 February, 2006). *Disciplinary patterns in E-learning: What technologies and approaches are used in the different communities?* Presentation at the E-Learning in the Disciplines Symposium, HEA and JISC, Birmingham, UK. Retrieved March 14, 2006 from <http://www.heacademy.ac.uk/learningandteaching/ELJohnCook.ppt>

<sup>21</sup> Margaryan, A., Currier, S., Littlejohn, A., & Nicol, D. (2006). *Learning communities and repositories*. CDLOR Deliverable 1. JISC, UK (52 pp.). <http://academy.gcal.ac.uk/cd-lor/learningcommunitiesreport.pdf>

<sup>22</sup> HEA (2006). *Reflections on key curriculum outcomes, challenges and e-learning issues from cognate discipline groups*. Report on the outcomes of the E-Learning in the Disciplines Symposium, HEA and JISC, Birmingham, UK. Retrieved March 14, 2006, from <http://www.heacademy.ac.uk/learningandteaching/ELDisciplinesCombinedReflections.doc>

<sup>23</sup> Masterman, L., & Lee, S. (2005). *Reusing learning materials in English literature and language: Perspectives from three universities*. Report on HEA English Subject Centre Mini Projects. The English Subject Centre, University of London, UK. Retrieved March 14, 2006, from [http://www.english.heacademy.ac.uk/archive/projects/reports/reuse\\_lams\\_oxford.doc](http://www.english.heacademy.ac.uk/archive/projects/reports/reuse_lams_oxford.doc)

In addition, discipline-specific teaching and learning models as well as types of knowledge these disciplines work with can impact utilisation of LORs (Becher and Trowler, 2001<sup>24</sup>; Meyer and Land, 2002<sup>25</sup>). 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 in ways of collaboration and communication can be another factor that could influence utilisation of LORs (McGill et al., 2005<sup>26</sup>). Although much more research is needed to unpick disciplinary differences underlying sharing and reuse of resources, it would be useful to 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 could 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. For repositories operating on national or international scale further challenges could involve getting various institutions, potentially all 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 could be exacerbated when repositories operate in an international context. Culture can 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- or department-based) 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 prefer to share resources with locally based colleagues (Margaryan, 2006<sup>27</sup>; Strijker, 2004). 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, you might want to think further about their specific characteristics. The following questions could be helpful in guiding you through this analysis. If your repository aims to serve more than one community, answer questions 3 to 8 for each of the communities.

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<sup>24</sup> Becher, T., & Trowler, P. (2001). *Academic tribes and territories*. Buckingham, UK: Society for Research into Higher Education and Open University Press.

<sup>25</sup> Meyer J.H.F. & Land R. (Eds) (2006) *Overcoming Barriers to Student Understanding: Threshold Concepts and Troublesome Knowledge*. London and New York: RoutledgeFalmer.

<sup>26</sup> McGill, L., Nicol, D., Littlejohn, A., Grierson, H., Juster, N., & Ion, W. (2005). Creating an information-rich learning environment to enhance design student learning: Challenges and approaches. *British Journal of Educational Technology*, 36(4), 629-642.

<sup>27</sup> Margaryan, A. (2006). *Report on personal resource management strategies survey*. CD-LOR Deliverable 7. JISC, UK.

Available from <http://academy.qcal.ac.uk/cd-lor/arch.html>

Strijker, A. (2004). *Reuse of learning objects in context: Human and technical aspects*. Enschede, The Netherlands: Ipskamp. Available from <http://130.89.154.170/proefschrift/>

Answering these questions will most probably require 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 your community existed before the LOR was introduced, or does the repository aim to bring a new community together?
- If your 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, or 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)?

If it concerns a pre-existing community, its original purpose will most probably be broader than sharing and reusing resources. For example, DIDET<sup>28</sup> is 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. In relation to the repository specifically, 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 repository is likely to impact the activities of the community. For example, how will the repository fit with the established patterns and ways of doing this within the community? Will introduction of repository shift these patterns and goals? Will it perhaps necessitate new types of activities?

### **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 you might want to explore is: Who are the main actors in the community and what are their roles and responsibilities? A teaching and learning community could 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. You might want to find out how these actors interact and what their respective

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<sup>28</sup> DIDET <http://www.didet.ac.uk/>

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, who will not be direct contributors but who are the policy makers whose role in uptake and use of repositories is crucial in that they are the ones 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 the end-users, but 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 for learners 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 original communities – all of the UK Higher and Further Education as well as the JISC-funded projects - are too 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 a person who serves as a “contributor.” The role of the contributor 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, it might be useful to seek answer to the following question: What pedagogic approaches and teaching methods are primarily used within the community? Then, you might want to consider how introduction of a repository might impact these pedagogies and vice versa.

### **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 on the sharing of resources and in the use of LORs within communities.

For example, communities served by classroom-based or institutional repositories, such as DIDET or NDLR which we discussed earlier, will often be more closely knit than communities served by national or international repositories, such as Jorum and 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 might be impacted by the spatial location of community members as well as their skills and comfort in using ICT.

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 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 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 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

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.

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

Use of repositories might be influenced by variables of the broader context within which community operates. These factors involve a range of external stakeholders or implicit and explicit rules that govern the functioning of the community. External stakeholders might include, for example, various professional bodies, governments and institutions. You might want to explore what these factors are for your particular community, and consider potential implications of these stakeholders' regulations and policies with respect to the utilisation of repository by the community.

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, as well as policies for ICT support. All of these factors can 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 community. Jorum, which is funded by the UK government, identifies that the important contextual factors for them are IPR 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 could 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]**

Business model concerns the trading and management framework underpinning the repository. Repositories could adopt different business models, and they could 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.

For example, in the case of Jorum, trading model is particularly critical, with incentives possibly being financial within and across disciplines. 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, barter, royalties, payments- would 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, 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, 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 staff to participate.

### **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.

A summary of questions, dimensions, issues, solutions and examples discussed in this section is provided in Table 2:

**Table 2. Analysing communities: Questions, dimensions, issues, solutions and examples**

Questions	Dimensions	Issues	Solutions	Examples
1. Why are you setting up a LOR?	R-Purpose	Misalignment with community needs and context	Systematically analyse community needs and context	Questions 1 to above
2. How many communities do you serve? 2.1. Does your community exist?	C-Composition  C-Composition	If community does not exist, it shouldn't be assumed that it will coalesce once the LOR is available	Plan implementation and innovation management strategy and specific activities for enabling growth of community  Ensure you can convince prospective users that your LOR has <i>relative advantage</i> over their current tools; is <i>compatible</i> with	SIESWE LE: a dedicated person to help generate and grow their communities  MERLOT: member directory with rich information about users; low barriers to entry; annual conference; Journal of Online Learning and Teaching

<p>2.2. What educational sector does the community operate in?</p>	<p>R-Sector</p>	<p>Communities in various sectors have different needs – for example FE standardised vs. HE non-standardised curricula; focus on research vs. teaching</p>	<p>their current practice/values; is <i>easy to use</i>; that users can <i>test</i> your LOR for some time before they decide whether to adopt it or not; that users can see <i>observable results</i> of what your LOR can do for them in their context and job.</p> <p>Understand what the various needs are and consider these in your LOR design and adoption strategy</p>	<p>For a discussion on cross-sector differences in reuse see Littlejohn, Jung and Broumley, 2003</p> <p>For example, if more than one educational community is involved, managing access to curricula-based taxonomies rather than the objects themselves could be useful - see CDLOR “Managing Access” use case available from <a href="http://academy.gcal.ac.uk/cd-lor/extended_usecases_v1p0.pdf">http://academy.gcal.ac.uk/cd-lor/extended_usecases_v1p0.pdf</a></p>
<p>2.3. What is the subject discipline of the community?</p>	<p>R-Discipline</p>	<p>Cross-disciplinary differences in:</p> <ul style="list-style-type: none"> <li>- patterns of technology use</li> <li>- patterns of reuse</li> <li>- curriculum outcomes</li> <li>- preferred pedagogic approaches</li> <li>- types of resources being shared</li> <li>- preferred ways of collaboration and communication</li> </ul>	<p>Understand what the various needs are and consider these in your LOR design and adoption strategy</p>	<p>On disciplinary impact on sharing and reuse Russell (2005); on patterns of technology use in disciplines see Cook (2006); on disciplinary difference in learning outcomes and pedagogic approaches see HEA (2006); on preferences for types of resources reused see Masterman &amp; Lee (2005); on types of knowledge in disciplines see Becher &amp; Trowler (2001); Meyer &amp; Land (2002).</p> <p>For example, see the CDLOR use cases “Managing access”, “Community support for learning resource adaptation”, and “Reflective practice when embedding learning resources” – all available from <a href="http://academy.gcal.ac.uk/cd-lor/extended_usecases_v1p0.pdf">http://academy.gcal.ac.uk/cd-lor/extended_usecases_v1p0.pdf</a></p>
<p>2.4. What is the scope of the community?</p>	<p>R-Scope</p>	<p>Implications for:</p> <ul style="list-style-type: none"> <li>- coherence of communities;</li> <li>- communication and interaction within the communities;</li> <li>- user training and support</li> </ul>	<p>Understand what the various needs are and consider these in your LOR design and adoption strategy</p>	<p>For a discussion and further references on cross-cultural aspect of resource sharing see Margaryan et al (2006)</p>

		Cross-cultural differences		
3. What is the purpose of the community that the repository will serve?	C-Purpose	<ul style="list-style-type: none"> <li>- Community formation</li> <li>- Typical activities in the community</li> <li>- Established patterns of functioning within the community</li> </ul>	Understand the historical development of the community and consider these in your LOR design and adoption strategy	
4. Who are the key actors in the community and who, of these, will contribute to the repository?	C-Roles and R-Contributors	<ul style="list-style-type: none"> <li>- Implications for distribution of roles and hierarchies within community</li> <li>- Various types of actors and their interplay in contributing to LOR</li> </ul>	Understand current distribution of roles within your community, including those related to contribution to the repository	DIDET Jorum
5. What is the pedagogic approach of the community?	C-Pedagogy	<ul style="list-style-type: none"> <li>- Implications for types of resources being shared and for technology use</li> </ul>	Understand what pedagogies your communities are using and consider these in your LOR design and adoption strategy	
6. How coherent is the community?	C-Coherence	Implications of geographic scope of communities for their coherence.		
7. What are the modes of participation and communication within the community?	C-Dialogue	Spatial location of community members and their ICT skills can have impact on use of tools to support communication – and subsequently use of LORs	Understand your community's modes of communication and tools used to support it and consider these in you LOR design and adoption strategy	For examples of different models of interaction see MERLOT, IVIMEDS, and Jorum.
8. What is the ecology of the community?	C-Context	<ul style="list-style-type: none"> <li>- Misfit with the broader policies and regulations; institutional strategies and policies</li> <li>- Rewards and incentives</li> </ul>	Consider potential influence of policies, rules and strategies on adoption of the repository by community	Implications of diverse legal frameworks (SIESWE LE)
9. What is the business model of the repository?	R-Business model	<ul style="list-style-type: none"> <li>- Risk analysis and management</li> <li>- Governance</li> <li>- Funding, auditing and accounting</li> <li>- Legal frameworks (e.g. IPR)</li> </ul>		Business model is critical (Jorum); trading model (tokens, barter, royalties, etc) is essential (SIESWE LE); trading model not applicable but user commitment necessary (DIDET)
10. How do you envision the evolution of your LOR?	n/a	<ul style="list-style-type: none"> <li>- Future development of communities</li> <li>- Competition</li> <li>- New technologies</li> <li>- Quality Control</li> </ul>	Plan for the future, by identifying and evaluating key external factors	