Project 3 Open Call Proposal

Title: Representing Aggregations of Open Educational Resources Utilising OAI-ORE

Proposers:
- Alex Lydiate, Educational Software and Systems Developer, University of Bath
- Vic Jenkins, Learning Technologist, University of Bath
- Kyriaki Anagnostopoulou, Head of e-Learning, University of Bath

Statement of experience

Alex Lydiate's technical background before joining the University of Bath was within the online marketing industry, developing large-scale data collection and distribution systems. Since joining the University his work has included developing the JISC-funded OSTRICH project's distributed OER repository.

Vic Jenkins has been leading on a JISC-funded OER project and is actively exploring ways of representing OERs in various repositories. Her educational background and significant experience in developing and delivering e-learning support and professional development programmes for teaching staff are invaluable in understanding the needs of the educational community.

Kyriaki Anagnostopoulou has significant experience in leading and project managing externally funded projects (JISC, HEA, LFHE, etc), many of which cross institutional boundaries and require the collaboration of disparate individuals. She takes a research and evidence-based approach to the use of technology, the outcomes of which strategically informed policy, projects aimed at large scale innovation, quality enhancement, guidance and support services.

Context/Rationale

In order for Open Educational Resources to fulfil their potential they must be made openly accessible. In order for that accessibility to be at its widest, each resource must be readable by both human and software-based agents, requiring that the resources be described using a common ontology.

An OER as submitted to repositories, such as Jorum, will often be a part of an aggregation of resources of different types (i.e. a list of learning outcomes which may link to a number of activities, which may further link to assessment questions, etc). However, each resource is found at a distinct URI and as thus appear to users of the repositories as single, stand alone items only. Therefore, beyond describing the individual resources there exists a pedagogical need to be able to present such resources on the Web as an integral group of objects – an aggregation. At a time when the number of OERs being released and the demands for more sophisticated use within e-learning are growing exponentially, the need to adopt a proven standard to describe aggregations of educational resources is becoming more prevalent. The ability to understanding mappings amongst various types of resources will facilitate academics and other repository users in their discovery, evaluation and re-use of OERs for learning and teaching purposes.

Although metadata and standards are key to describing OERs, often aggregations are stored and identified in an architecture-specific manner which is unique to each repository. Thus, when attempting to provide improved access to resources by copying/moving objects between repositories, the outcome often results in individual URI-identified resources being deposited in the new repository without any identifiable links and relationships. This issue has been encountered by a number of JISC funded OER projects (for example OSTRICH) which as well as making resources available via their institutional repositories are also requested to deposit them in Jorum.

There is an obvious need for using a standard framework for describing aggregated resources. Two particular standards frameworks are of importance when considering how best to address this issue:

- Of the many metadata standards available the IEEE's Learning Object Metadata (LOM) standard offers the best fit in terms of describing individual resource objects within an OER, in terms of its scope, maturity, specificity and widespread adoption. More specifically, LOM's ability to describe detailed properties of a learning object (i.e. technical characteristics, file format, size, etc) make it of much greater use to OERs than a more generic standard such as Dublin Core. This is particularly evident when attempting to translate a well defined LOM document into a fully-defined Dublin Core document. This task is reasonably straight forward, however, a fully-defined Dublin Core document cannot be translated into a fully-defined LOM document.

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- By its design LOM can only describe an individual resource and therefore another standard must be considered. Although it is relatively new, the Open Archive Initiative Object Reuse and Exchange standard (OAI-ORE) it is gaining good traction and educational institutions (i.e., University of Oxford, etc) have started using it for describing aggregations of educational resources. With ORE, a resource is introduced that represents a collection of other resources, named an *Aggregation*. The Aggregation, in turn, introduces another resource, the *Resource Map*, to describe it. This Resource Map lists the all the resources contained within the Aggregation and can also express the properties and relationships pertaining to them. Within the Resource Map, therefore, we can describe the individual resources using LOM properties.

This project proposes to make use of both of these standards in addressing the issue - IEEE LOM as the resource descriptor with OAI-ORE as the aggregation descriptor in order to semantically present OERs on the Web. Furthermore, there is a need to develop software component(s) which will allow institutions to easily adopt this combination of descriptive frameworks.

Aims and objectives
The proposed project aims to demonstrate the use of OAI-ORE to describe aggregations of educational resources in a way which will harness expertise, share knowledge and foster discussion and debate. In doing this the project will:

- Form a UK-wide virtual project advisory group made up of institutional repository owners/developers
- Evaluate the feasibility of adopting the combination of OAI-ORE and LOM as a standard in its own right for modelling and representing aggregations of OERs on the web so as to address the identified issues
- As a proof of concept, the team will design and implement a component able to parse aggregations and translate them into the RSS format required by Jorum's RSS endpoint registry.

Methodology
In meeting the stated objectives the team envisages taking the following approach:

Establish UK-wide project advisory group	The project team will tap into the wealth of knowledge and expertise within the community concerning this topic. Invitations will be sent to repository owners and developers in UK FE/HE institutions to join the project team online.
	Initially, the group will focus on establishing user needs, informing the design of the components and their public interfaces, and giving feedback concerning which services might be implemented to best serve the needs of the community. In the second half of the project the advisory group will be invited to evaluate developments to date, reflect on the feasibility of the standards adopted and make recommendations to the wider community of practitioners.
	It is the intention of the team to seek to gauge and benefit from an international perspective; the OAI-ORE is much more widely implemented in the US and it would of value to understand the lessons learnt from the experiences of specific American institutions. This too will be presented to the advisory group for discussion and debate.
Evaluate feasibility of project's approach to modelling/representing aggregations of OERs	The online discussions of the advisory group will be appropriately captured, analysed and made available as a short paper. The paper will outline opportunities, barriers and any associated risks of adopting this approach to describe OERs and will aim to make appropriate recommendations to the community.
Design/implement technical components	This project does not seek to re-invent the wheel and specify new standards. OAI-ORE's Resource Maps are written in either RDF/XML, RDFa or Atom XML, all now well-proven. The project team will follow this example by using

	well-established open standards and examine/work with established design patterns, in particular those presented by the Fedora framework. The components will be designed and implemented with the intent that other developers would use them as part of their own applications, utilising well-defined public interfaces. The software components implemented by this project will be released under a General Purpose License (GPL). The design of the components will be approached in a manner which would allow for the design documents themselves to potentially become OERs of value. By using an object-oriented approach and presenting the design in UML subsequent projects would be able to use the design to implement, or influence their own design, of software components using their own chosen technologies without the necessity to reverse-engineer any component delivered by this project.
Reporting/tracking	A project website will be set up as a reference point for the advisory group and will also function as a dissemination route for the deliverables and the outcomes of the project.

Proposed Deliverables

Technical
- GPL released PHP 5.3 object-oriented component or components offering clear API services to model Open Educational Resources as OAI-ORE resources and to translate them into the format required by Jorum's RSS endpoint registry.
- Creative Commons licenced UML design documents for those components, released as OERs.
- A paper detailing the design rationale, noting any compromises and technical issues encountered and an evaluation of the components.

Non-technical
- Foster engagement within the community around the issues the project is addressing (minimum 3 online meetings)
- A short paper/report capturing the essence of the discussion, outlining the issues associated with this approach and make recommendations as appropriate.