# FORMATIVE EVALUATION OF THE JISC IEMSR PROJECT

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# Formative Evaluation of the JISC IEMSR Project

| *Reference* | *Date* | *issue* |
|---|---|---|
| ESYS-2004470-RPT-001 | 26 April 2005 | 1.1 |

| *Contract no* | *project no* | *client* |
|---|---|---|
| Contract dated 7 September 2004 | 2004470 | UKOLN |

| *author* | *approval* |
|---|---|
| Oliver Greening<br>project manager | Jim Boucher<br>project authority |

*distribution*

| | | |
|---|---|---|
| Rachel Heery | *electronic copy* | UKOLN |
| File 2004470 | *electronic & hard copy* | ESYS |



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**Amendment Record**

| *Issue* | *Revision* | *Date* | *Details* |
|---|---|---|---|
| Draft | A | 24 March 2005 | First draft for internal review |
| | B | 01 April 2005 | Draft version for client comment |
| 1 | 0 | 26 April 2005 | Final version addressing client review comments and incorporating summary observations from user workshop test scripts (sections 2.4.2 & 2.4.3) |
| 1 | 1 | 26 April 2005 | Final version following internal review |



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# 1 INTRODUCTION

This document is the formative evaluation of the Information Environment Metadata Schema Registry (IEMSR) a project funded through the JISC Shared Services Programme. In particular the report examines the extent to which the project to develop a metadata schema registry as a pilot shared service for the JISC Information Environment (IE) has made progress towards meeting its objectives, including its anticipated outputs, outcomes and benefits.

## 1.1 Background

The IEMSR project aims to *"develop a metadata schema registry as a pilot shared service within the JISC Information Environment. Metadata schema registries enable the publication, navigation and sharing of information about metadata."* [Ref. 1]. The ambition is for the IEMSR to act as the primary source for authoritative information about metadata schemas recommended by the JISC IE standards framework. The Registry is targeted at the UK education community where both Dublin Core (DC) and IEEE Learning Object Metadata (LOM) standards are used to build schemas. Metadata within the JISC IE is based largely on DC and IEEE LOM.

A metadata schema registry is "*an application that provides services based on information about metadata vocabularies, the component terms that make up those vocabularies, and the relationships between them*" [Ref. 2]. The information about metadata vocabularies is provided and described in the form of schemas (themselves sources of metadata). A centralised metadata schema registry acts as a repository for this data, including schemas, which are conveniently stored at a single location and made available through the services of the registry.

The IEMSR project builds on previous work by DESIRE[1], MEG[2] and CORES[3] projects. In 2002 UKOLN's MEG project was funded by JISC and BECTA which developed a Resource Description Framework-based registry and schema creation tools. These tools were focused on DC standards and did not address as well the more hierarchical model of IEEE LOM. The IEMSR project proposed to re-engineer the MEG software tools to better accommodate the IEEE LOM format to improve the interoperability of DC and IEEE LOM and the co-operation between the two standardisation communities.

UKOLN, University of Bath in partnership with the Institute for Learning and Research Technology (ILRT), and with support from CETIS[4] and BECTA[5] were awarded a contract by JISC in January 2004 to undertake the IEMSR project. The project is funded under the Shared Services Programme, as follow-on to earlier work that had been jointly funded by JISC and BECTA. The 18 month development project started 1st January 2004 and will finish by 30th June 2005. The IEMSR contract value is £152,185.

## 1.2 Purpose and scope of the evaluation

The principal aim of this formative evaluation is to examine the progress made by the project in meeting its stated objectives and to assess the extent to which expected outputs, outcomes and benefits have been realised. The evaluation findings will also help to inform the project as it enters its final stages and to guide follow-on development work.

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[1] http://desire.ukoln.ac.uk/registry/

[2] http://www.ukoln.ac.uk/metadata/education/regproj/

[3] http://www.cores-eu.net/

[4] Centre for Educational Technology Interoperability Standards

[5] British Educational Communications and Technology Agency

In detail the evaluation considers:

**Outputs and stakeholder benefits** - the project's objectives have been examined in order to come to a judgement about the overall achievements of the project to date, including:

- The 'appropriateness' of the project objectives - both technical and strategic.
- Whether they are sufficiently 'challenging'.
- The extent to which project objectives have been technically achieved and in what ways has (or will) their achievement deliver significant stakeholder benefits.

**Sustainability** – IEMSR is an 18-month development project funded by the JISC Shared Services Programme.

- Is the partnership model appropriate for this type of pilot development project?
- Does the project demonstrate valuable outputs / outcomes which would merit further funding?
- What are the key factors for sustainability for the service?

**Project management** – the project is a partnership between UKOLN and ILRT. UKOLN has overall project management responsibilities. CETIS and BECTA are representing the IEEE LOM and DC user communities. The following management issues are examined:

- Have there been any significant delays to the project, if so, what have been the impacts?
- Are the project resources and management arrangements sufficiently effective to deliver successful outcomes?

## 1.3 Methodology

Figure 1-1 summarises the evaluation methodology.

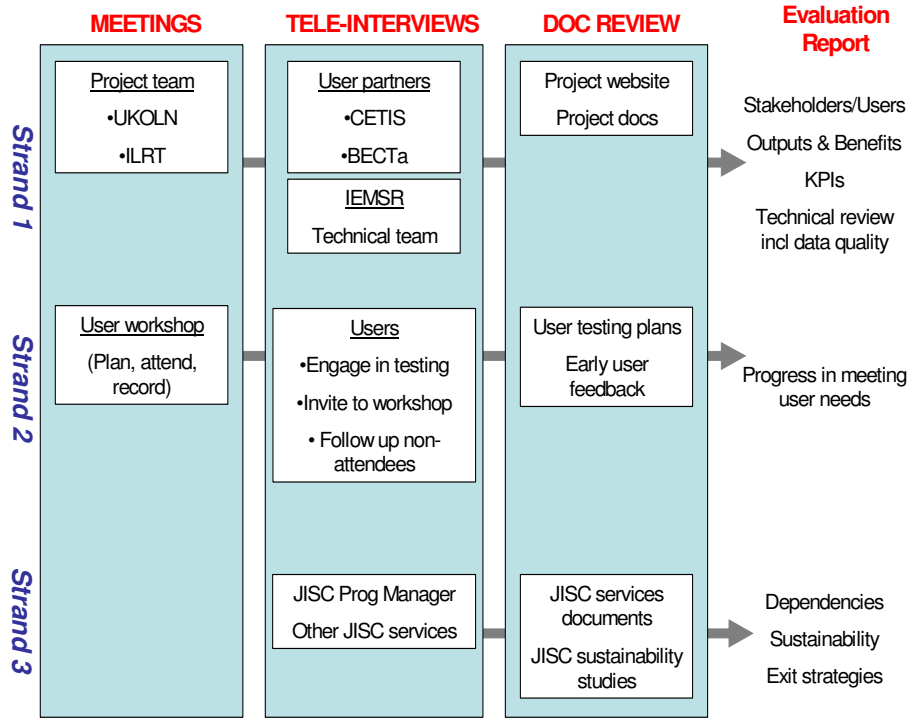


***Figure 1-1 Evaluation methodology***

Three strands of activity were conducted:

*Strand 1*: initial meetings with the project team were held to identify the original aims of the IEMSR, the needs and potential users identified when the registry was conceived, progress to date and any early user feedback. Plans to capture user feedback for a user testing workshop were discussed. Discussions with the development team and the review of project documentation helped to explore the technical solution adopted and to build an understanding of development and implementation issues.

*Strand 2:* a user testing workshop (15 March 2005) was attended and user feedback recorded through structured test scripts and informal discussion.

*Strand 3:* A final input to the evaluation report will explore sustainability issues, drawing on recent sustainability studies undertaken for JISC and feedback from stakeholders and JISC Programme managers. Issues for the project-to-service transition will be outlined.

### 1.4 Main sources of information

This evaluation was informed by reference project documentation and through consultation with project stakeholders. A list of meetings and key documents are listed below. A list of stakeholders consulted is provided in Appendix A.

**Meetings:**

- Technical meeting, 3 November 2004 ILRT, Bristol
- Project meeting, 23 November 2004 ILRT, Bristol
- Workshop, 15 March 2005, University of Bath

**References**:

1. IEMSR Project Plan, version 02, 30 March 2004
2. Baker, T. quoted in Functions of the IEMSR, final version, 29 October 2004
3. IEMSR Project Proposal, 4th November 2003
4. Notes from Technical Meeting, 17 December 2004
5. IEMSR project website (http://www.ukoln.ac.uk/projects/iemsr/)

### 1.5 Contents of the report

The remainder of this document is structured as follows:

Chapter 2 reviews the contribution and objectives of the IEMSR. A summary of the user needs and a review of progress in technical development are also presented.

Chapter 3 presents the main comments and observations captured from stakeholder consultation. A summary of common issues is also provided.

Chapter 4 provides concluding comments on outputs and benefits, sustainability and project management issue

Chapter 5 presents a set of recommendations to the project team to help consolidate the closing project activities and to guide future development work

# 2 THE IEMSR CONTRIBUTION

## 2.1 Introduction

This section summarises the project objectives, user needs and the progress made towards achieving the main technical development deliverables.

## 2.2 Objectives and scope

The IEMSR project proposes to build a JISC IE Metadata Schema Registry as a shared service within the JISC Information Environment. The Registry will act as the primary source for authoritative information about metadata schemas recommended by the JISC IE standards framework. However, it is noted that "*The project is not intended to include comprehensive registration of 'controlled vocabularies' and subject schemes, the focus will be on describing controlled vocabularies associated with registered application profiles.*" [Ref. 1].

The Registry has four main objectives [Ref. 3]:

1. Provide a Web interface to browse existing DC and IEEE LOM schemas and application profiles, and to register new schemas and application profiles. A Web interface to the Registry will allow human users to create new schemas and application profiles and browse existing application profiles.

2. Provide machine to machine access to DC and IEEE LOM schemas and application profiles. The Registry will provide an Application Program Interface (API) through which applications can query the data indexed by the registry. Data returned will include locators for XML Schemas where available.

3. Provide validation service case study. This case study should demonstrate a service which would allow users of the registry to upload an application profile of their own creation, and have it checked and validated according to registered standard schemas (such as DC or IEEE LOM).

4. Provide open source software. The project will establish a shared open source development model (such as SourceForge) to facilitate co-ordination of development work, packaging of releases, software testing and quality assurance.

It is anticipated that the development of the Registry will begin to deliver the generic benefits associated with metadata schema registries which are summarised as [Ref. 1]:

- Single site for DC and IEEE LOM metadata for UK FE/HE community
- Promotion of existing metadata schema solutions
- Increased interoperability between schemas as a result of re-use across applications
- Less duplication of effort amongst implementers
- Managed evolution of schemas
- Encouragement of harmonisation between 'competing' standards

The more intangible benefits anticipated from the project are [1]:

- DC and IEEE LOM communities working more closely together in UK HE/FE sector
- Less duplication of effort amongst implementers
- Promotion of existing metadata schema solutions
- More clarity regarding the Application Profile model

- Support for implementers to construct 'well-structured' Application Profiles

## 2.3 User needs

### 2.3.1 User / stakeholder groups

The project proposal [Ref. 3] states that registries address the needs of several groups within the JISC IE:

- **Information seekers** who need to know the semantics of available metadata in order to design query or data merging strategies
- **Schema creators** who need to design standards-based formats for their own metadata records following best practice in a particular field of knowledge
- **Developers of other registries** who want to ensure their registries include authoritative schemas
- **Maintainers of metadata standards** who want to identify emergent semantics as candidates for formal standardisation
- **Developers of software systems** that can use a registered schema base to configure metadata creation tools, merge metadata from a diversity of sources, or convert records from one format or standard into another.

An assessment of these user groups and the identification of specific stakeholders of the IEMSR project were undertaken as part of the IEMSR Project Plan (see Table 2-1).

| Stakeholder | Interest / stake | Importance |
|---|---|---|
| JISC IE Shared Service Programme | Effective development of infrastructure services | High |
| CETIS | Disseminate information about IEEE LOM standard, IEEE LOM UK Core and derived application profiles | High |
| Becta | Interest in role of registries to facilitate effective re-use of schemas, interest in role of registries for quality assurance | High |
| Metadata schema creators and maintainers within JISC projects and services using (application profiles of) the DC and IEEE LOM standards | Requirement for easy access to information about existing schemas and application profiles | High |
| Commercial suppliers of software products and services to JISC IE projects and services. | Requirement for access to machine readable schemas and application profiles deployed within JISC IE | High |
| Potential users of 'JISC IE shared infrastructure services' within JISC projects and services | • Requirement for access to machine readable schemas and application profiles deployed within JISC IE<br>• Requirement to 'publish' machine readable schemas and application profiles used within implementations | High |
| Wider DC community | Interest in functionality of schema registries | Medium |
| Wider IEEE LOM community | Interest in functionality of schema registries | Medium |
| Other registry activity | Interest in collaboration | Medium |

***Table 2-1: IEMSR stakeholder analysis (source: IEMSR Project Plan [Ref.1])***

In addition to these specific user needs identified above, the project identified that registries can be used in promotion, quality assurance and preservation of schemas and application profiles within the JISC IE.

### 2.3.2 Activities to address user needs

An underlying assumption made by the project was that the development of the IEMSR would stimulate interest within other organisations that are establishing schema registries and looking to harmonise across user community boundaries. Collaboration with other registry activities including DCMI[6], OAI[7], SIMILE[8] and CETIS was proposed and carried out informally.

An initial brainstorm (Technical Meeting, 16 January 2004) attempted to identify potential users across both DC and LOM communities. Further expansion of the stakeholder community was also discussed. However, it was reported at this early stage that it was proving difficult to capture user requirements for the innovative IEMSR service. It was also felt that the high and varied user expectations could place the development at risk. The project is attempting to address the interoperability between metadata standards. On the surface this may appear simple, but in reality this is a complex issue. It was not possible for the full range of user requirements to be met at this early phase of development.

A full range of user requirements and usage scenarios was discussed with CETIS and BECTA at the first project meeting (9 March 2004). Four usage scenarios were outlined and prioritised to help focus the development work. These were: disclosure, discovery, instance metadata creators and design/construction of new application profiles. However, it was thought necessary to continue to capture requirements from a wider community to clarify issues of scope. Each of the four usage scenarios still involve different types of users with different needs which need to be mapped.

Following early progress with the technical specification and development work, it was decided (Technical Meeting, 9 August 2004) that additional usage scenarios were required, particularly for machine-to-machine (m2m) usage. RELOAD[9] and Curriculum Online[10] were suggested as potential sources. This issue was again raised at the second project meeting (23 November 2004) and a decision to approach Intrallect and BECTA/Knowledge Integration was made. At a following technical meeting (17 December 2004) it was agreed to capture high level requirements from the potential use of the Registry by Curriculum Online's tagging tool. A set of potential use scenarios for the IEMSR within the IE are defined in the 'Functions of the IE Metadata Schema Registry' (Final version, 29 October 2004). These are:

- Content providers
- Fusion services
- Presentation layer services
- Shared infrastructure services
- Metadata vocabulary portal

It is not clear how these use scenarios (a mix of applications and users) relate to the four usage scenarios (process-driven) outlined earlier and some form of mapping may help to clarify this.

At the August 2004 Technical Meeting the outline of a dissemination plan was agreed. Two target audiences were identified - schema creators and developers of tools and services that might interact with IEMSR. Project presentations had already been made at several events (meeting/workshops/conferences) during the summer period. It is not clear whether any

[6] Dublin Core Metadata Initiative
[7] Open Archives Initiative
[8] Semantic Interoperability of Metadata and Information in unLike Environments
[9] Reusable eLearning Object Authoring and Delivery
[10] www.curriculumonline.gov.uk

useful feedback was received and captured at these events and how this was reflected in subsequent development or dissemination activities.

The second project meeting (23 November 2005) provided the first opportunity for CETIS and BECTA to 'test' and provide user feedback on the Web interface to the registry and authoring tool. Feedback was captured during the meeting and through follow-up correspondence. User comments were fed back into the development process.

A project workshop was held on 15 March 2005 to allow potential users to test both the web site and data creation tool. Representatives from CETIS, BECTA and JISC projects/services (IESR, JORUM and SOSIG) attended. During the workshop two practical sessions were conducted which required attendees to complete test scripts and to record their experiences and comments. A wrap-up discussion allowed further comments to be captured. Feedback from the workshop will help to focus the remaining development work.

Feedback captured by during the test sessions is summarised in the sections below. Verbal feedback captured at the workshop is included in section 3.

### 2.4 Technical review

The core technical development component of the project focuses on four key deliverables. These are:

- An enhanced data model based on the MEG data model (DC-based) and incorporating the hierarchical IEEE LOM format
- A Metadata Schema Registry providing tools for schema creation and registration in both DC and IEEE LOM format
- A desk-top schema creation facility
- An Application Program Interface (API) for m2m usage of the Registry

The following sections summarise the progress made in achieving these key deliverables.

#### 2.4.1 Enhanced data model

*"Based on the MEG data model, the project will produce an enhanced data model to incorporate the more hierarchical structure of IEEE LOM. The data model will include 'schema' as an entity and a pointer from application profiles to relevant XML schema."* [Ref. 1].

Interim data models for both the Dublin Core Application Profile (DCAP) and Learning Objects Metadata Application Profile (LOMAP) were developed and documented by August / September 2004. Model development was made with input from both DC and LOM user/developer communities. This was completed approximately 3 months behind the original project schedule [Ref. 1, work packages].

It was agreed at a Technical Meeting (9 August 2004) following user consultation that 'extended data elements' would not be included in the model. This issue was first raised at an earlier Technical Meeting (7 June 2004), but it is not clear why this decision was made.

Together with the interim 'Functional Requirements of the IEMSR' (Draft, 1 September 2004), these specification provided the developmental framework for the MSR tools. A supplementary to the functional requirements (20 January 2005) was made following informal review comments by CETIS and BECTA.

### 2.4.2 Metadata Schema Registry tools

*"A schema creation and registration tool will be developed by ILRT according to the functional specification produced by UKOLN. The tool will enable distributed creation of schemas for DC and IEEE LOM element sets and application profiles either in a standalone fashion or in interactive mode with the MEG registry. The registry will provide information about schemas and application profiles as well as indexing the schemas and application profiles."* [Ref. 1].

There are four parts to the development of the tools:

- Development of the schema desktop client
- Development of the registry server
- Development of the registry web site
- Development of initial data for the registry

The software development uses open source code (SourceForge schemas project).

Full-time development work on the Registry server and client started in October 2004. This appears to be a delayed start largely due to the availability of programming staff at ILRT. The first presentation of progress with tools development was made at a Project Meeting (23 November 2004). An evaluation workshop was originally scheduled for this date to provide users the opportunity to test the MSR tools. Delays to the project timetable required a rescheduling of development work. It was agreed to reschedule the workshop to 15 March 2005 (Project Meeting, 23 November 2004).

The main cause of the delay to development was attributed to an under estimation of the complexity in building the authoring tool and the availability of appropriate development staff:

*"Development of the authoring tool is turning out to be more complex and difficult than originally anticipated, due to both the complexity of handling two data models (Dublin Core and IEEE LOM) and the use of Java for the development environment. This situation has been exacerbated by delays in allocation of development staff to the project."* [Ref. 4]

These issues were addressed by focusing on the essential functionality of the authoring tool and more frequent progress reports on development work.

The IEMSR data creation tool was presented and tested at the user workshop (15 March 2005). Participants worked through structured test scripts and were asked to record their feedback and observations. The main points from the user feedback are summarised below:

Creating a description of an Agency

- Generally described as an easy task, but confirmation of actions completed would improve user confidence (e.g. "*not obvious that an Agency was created*")

Creating a description of a DCAP

- Creating a summary description of the DCAP was described as an easy task
  - Using the search facility to find properties, and then describing selected properties caused some confusion. Example user comments: "*assumes knowledge of DC metadata profile*", "*not easy to associate classes with properties*", "*not obvious that 'select' means tick box*"
  - Saving and submitting a new DCAP to the Registry was described as a generally easy and intuitive task.
- Modifying a description of a DCAP - opening and modifying a DCAP was generally described as easy task

- Creating a description of a metadata vocabulary – generally described as an easy task

Creating a description of a LOMAP

- "*Overall quite a good tool. Fairly easy to use and intuitive*"
- Some of the fields used in the application profile were not understood. A clearer definition of fields would be useful.
- It was not always clear what data should populate the available fields, e.g. specification/guidelines and condition.
- One participant suggested it would be interesting to see how vocabularies could be added.

Verbal feedback captured at the workshop is included in section 3.

### 2.4.3 Schema creation facility

*"The usability and presentation of the schema registration tool as a desktop application will be considered. The existing Java based MEG schema creation tool may not be suitable for creation of IEEE LOM Application profiles."* [Ref. 1].

At an early Technical Meeting (7 June 2004) a recommendation was made to convert the MEG creation tool (based on SWING) with Eclipse SWT to better support different platforms (e.g. Windows/MAC/Linux).

A requirement from the supplementary functional requirements was to improve the presentation of Registry data. It was noted (Project meeting, 31 January 2005) that finalising the presentation of data would take several iterations and that the user workshop would provide an opportunity to solicit feedback on this issue.

The web interface to the Registry tools, now based on a new SPARQL API, was presented and tested at the user workshop (15 March 2005). Participants worked through structured test scripts and were asked to record their feedback and observations. The main points from the user feedback are summarised below:

Starting off

- It was understood that the user interface is work in progress, but the general impression was that the interface needs to be a lot more user friendly with greater user guidance and help.
- The tab interface was accepted as a sensible approach.
- One participant suggested the search facility could be context specific and relate to the tab in current view.

DC and DCAP

- Navigation around the web site for basic information discovery produced a mixed response. Some found tasks very difficult, while others found tasks very easy. This reflected users' familiarity of DC and the website.
- Tasks related to locating properties produced a mixed response. This appears to be largely related to users' familiarity and understanding of DC terminology.
- Searching and investigating DCAPs was described as either a difficult or intuitive procedure. The structure of the site and the terminology used appeared to be the main causes of confusion (e.g. "*URIs are not suitable for humans to read*")

LOM and LOMAP

- Navigation and basic information discovery were described as easy tasks

- The presentation of browse results could be improved. The use of URIs was viewed as inappropriate.

Verbal feedback captured at the workshop is included in section 3.

The web interface is now partitioned, using tabs, to make the Registry more accessible by different user communities (DC, LOM, Agency, Resource Discovery Framework Data sources, Application Profiles, XML).

### 2.4.4 Machine-to-machine Application Program Interface

*"A Registry API will enhance the use and re-use of information stored in the registry and provides easy programmatic access to the information at a software level. It will enable applications within the JISC IE to query the registry, locate and download schemas. Provision of a registry API also means that the registry and creation tool can be weakly coupled, so that either the client or server can be replaced or improved independently."* [Ref.1].

There were difficulties experienced earlier in the project in collecting requirements for the m2m demonstrator from potential users (see section 2.3.2). At the 17 December Technical Meeting it was suggested that meeting these potential requirements (e.g. the potential use of the Registry by Curriculum Online) would require development work outside the scope of the current project. The feasibility of developing a m2m demonstrator could have been identified earlier.

It was agreed (Project Meeting, 31 January 2005) to postpone m2m work in order to focus resources on the development of MSR tools ahead of the user workshop.

# 3 RESULTS OF CONSULTATION

## 3.1 Introduction

This section reports on the stakeholder consultations conducted through telephone interviews and discussions at project meetings/workshop. The list of stakeholders consulted is presented in Appendix A.

It is stressed that those consulted were expressing their personal views, not the formal position of their respective project/organisations.

## 3.2 CETIS

CETIS is one of the IEMSR project partners and is providing input to user and functional requirements on behalf of the IEEE LOM community. CETIS have been involved in other UKOLN-led projects. They recently conducted testing of the MEG Registry.

The project is viewed as very ambitious, but very worthwhile in terms of stimulating interoperability between DC and LOM metadata standards within the JISC IE. The complexity of mapping the DC and LOM data models is recognised. There is no expectation that a complete and fully functional MSR will be developed by the end of the project. Several iterations beyond the scope and timescale of the current project are anticipated.

The main users of the Registry are expected to be Application Profile developers. At this stage of the development it is not appropriate to consider potential users from wider user communities.

The client interface to the Registry is considered “tricky”. The way in which the data is presented and the way the tools should be used is not intuitive, especially coming from a LOM perspective – it should be simple but effective. It is likely that the LOM community would continue to edit APs through XML schema bindings (this option was not fully functional at the workshop).

By the time of the workshop a huge improvement with the tools was acknowledged, although it was noted that there is still some way to go in interface design and functionality. The terminology used by the interface to the tools was a concern – it is going to be confusing for different user communities. It would make sense to limit the exposure of the tools to a core set of user communities until these issues have been addressed.

Some concern was expressed regarding the development process adopted by the project. A difference of ‘culture’ between DC and LOM communities was suggested as one possible explanation. An iterative approach to development was stressed as the most appropriate approach.

CETIS will encourage developers from the LOM community to use the Registry once it is launched. It is important to stimulate early interest in registries as it generally takes time to build a valuable resource.

Beyond the JISC IE, the e-learning community should be approached to enter data into the Registry.

## 3.3 BECTA

BECTA is one of the IEMSR project partners and is providing input to user and functional requirements on behalf of the DC community. BECTA has been represented by different

individuals at the project meetings and workshop resulting in the absence of a consistent view and opinions on the direction / objectives of the project.

BECTA can see the value of the online IEMSR tools to help co-ordinate and harmonise across BECTA activities and regions (NI, Scotland etc.). They have no plans to undertake a mapping between DC and LOM themselves and appreciate the attempts being made by the project to address this issue. They have supported the development process by feeding in user and functional requirements which have been taken into account.

Concern was raised at the workshop regarding the project definition of the term 'user'. Potential users within BECTA and educational institutions would not necessarily understand the terminology used by the Registry interface. However, it was added that this comment was made from the perspective of a potential 'novice' user rather than an 'expert developer'. A clearer picture of the target sectors / users would be required before any attempts to promote widely across BECTA and the educational sector. The 'life long learning' and post-16 sector were noted as potential areas to explore.

BECTA has worked on m2m requirements through other projects and know where they want to go in terms of integration. They are keen to support this component of the project.

BECTA/QCA, through a contract with Knowledge Integration, is developing a new vocabulary registry tool. A tagging tool is also planned by BECTA. This could be an area of convergence/collaboration.

### 3.4 IESR

A representative from the JISC Information Environment Service Registry project attended the workshop. This was the first exposure to the Registry tools. Overall the project approach was viewed as the correct direction to go, but ambitious. The development was regarded as timely as Application Profiles are being used on a more common basis.

Some confusion was expressed regarding the target user and whether the tools were to encourage the generation of new APs and/or the reuse of existing APs.

The Registry web interface needs further development, but it was recognised that this was an early prototype. The interface may need to appeal to a wide range of user communities and therefore the terminology needs to be thought out carefully. The addition of an HTML window would be a useful addition. Some interest was expressed in the availability of additional interfaces (m2m) to the Registry (e.g. OAI).

If the Registry is to be to promoted/presented to a wider community the benefits must be clearly defined and explained – what are the incentives for submitting APs? The future 'service' offering needs to be thought through and developed.

It was noted that there could be future interaction between IESR and IEMSR, but specific areas for potential collaboration/convergence were not yet clear.

### 3.5 JORUM

A representative from the JISC Online Repository for Learning and Teaching Materials project attended the workshop. The first exposure to the project was in November 2004 when invited to the workshop, originally scheduled for November 2004. Ad-hoc input, including via a CETIS meeting, has been made between November and the workshop (March 2005).

The value of developing the Registry for improved interoperability, especially through an m2m interface was appreciated.

First impressions from the workshop were that the tools are not currently 'novice'-proofed - was struggling with some of the terminology. Furthermore, it was not entirely clear what was on offer. This was viewed as a difficult usability issue which is likely to be difficult to solve given the potentially wide user audience.

It was suggested that there is a need to inform potential users that the Registry is under development and to demonstrate the potential benefits. However, it was remarked that in its present form it would not be appropriate as a public facing service.

In terms of service sustainability it was remarked that the JISC IE 'stamp of approval' would add a valuable provenance to the service. However, the Registry would need to consider approaches to encourage Registry use, especially content population. JORUM has benefited from JISC X4L projects being contracted to submit objects (~800-1000) to the repository service. Although the MSR is likely to hold a smaller volume of objects, this is a common issue faced by all repository services. The MSR perhaps has more in common with Archive services.

It was suggested by a representative from JORUM that the MSR may also suffer from licensing and ownership issues. There can be a strong reluctance to share resource, especially at an institutional level (a cultural issue). It may be appropriate to consider licensing agreements with different levels of privileges (e.g. query, add, edit/modify).

### 3.6 SOSIG

A representative from the Social Science Information Gateway attended the workshop. There had been no previous involvement in the project. SOSIG is part of the RDN and LTSN application profiles were already available on the test version of the Registry. It is unlikely that RDN services would be regular users of the Registry. It is probable that any new APs would be discussed off-line and then added by a technical expert once agreed.

The addition of a free text search facility on the Registry web interface was suggested. A full vocabulary should also be available through the data creation tool. The tools currently (at the workshop) assume expert users who are familiar with the tools, although it was admitted that a novice could become an expert after a period of regular use.

It was suggested that it was not clear whether the Registry would be used at an institutional level. From an RDN service perspective there could be scope for discipline-level APs, but there are likely to be issues of consensus across the discipline community. SOSIG uses a number of social science classifications/vocabularies to satisfy the requirements of the wider social science community.

### 3.7 Summary

The following common issues can be identified from the results of the consultation:

- Value – there is wide agreement that the IEMSR project is addressing several complex issues and that the potential benefits from improved interoperability are recognised.
- Target users – a clearer proposition is needed to distinguish priority users and usages of the IEMSR and what benefits each might expect from the service. In particular the needs of expert versus non-expert users should be addressed.
- Iteration – because of the complex nature of the project there is a common expectation that future iterations of the main Registry components will be required. There was no expectation that a fully functional service would be completed within the 18 month project period.

- Terminology – there is concern that the current prototype uses terminology that would not be understood by many potential user communities. This reflects some confusion regarding the intended user audience of the Registry.

Specific sustainability issues:

- Data provenance and conformance – these were identified as aspects which may affect the success of the Registry.
- Digital rights management (copyright / ownership) of APs – other projects have faced / are facing DRM issues. The MSR will need to consider the potential impact of DRM of the service
- Governance: is the service going to be maintained? – for the Registry to be accepted and used by the target communities it will be important to demonstrate clear governance and evidence of service continuity.

# 4 CONCLUSIONS

This section presents a set of conclusions based on the project review and results from user consultation. The conclusions follow the structure of the evaluation considerations (see section 1.2) and make reference to the critical success factors outlined in the Project Plan [Ref 1]. These are:

- Set achievable scope to project ambitions
- Ensure user expectations are realistic
- Establish good communication with potential users to achieve effective requirements gathering
- Prioritise functional requirements to ensure realistic software development schedule.
- Work towards establishing a sustainable service
- Adopt standards-based approach

## 4.1 General assessment

The IEMSR project is regarded as a valuable but ambitious development activity. It is apparent that the complexity of the proposed development was underestimated and that consequently the project has not advanced in line with the original project plan.

A clearer definition and mapping of the potential user base, usages and anticipated benefits could have improved the focus and prioritisation of the development. It is not yet clear how the IEMSR will be “sold” to different user communities.

Both CETIS and BECTA (representatives of the user community) recognise the complexity of the development and continue to support the project with inputs and requirements. Prototyping of this nature will involve several iterations of the core components (data model and functional requirements) before the service can be finalised.

## 4.2 Outputs and benefits

The following progress has been made against the project’s objectives (reported in section 2.2):

- Web interface - a simple interface has been designed and was demonstrated at the workshop. Feedback from the workshop suggests there is still work to be done to improve usability.

- Machine to machine access to DC and IEEE LOM schemas and application profiles - an initial investigation into requirements capture was begun, but this has been placed on hold while the core data model and Registry software is developed

- Validation service case study - work on the validation service case study has not started.

- Provide open source software - a prototype Registry server and data creation tool has been developed based on open source software. The client is written in Java and uses the Eclipse SWT+JFace library to provide an interface across Microsoft Windows (win32), Linux (X + GTK) and OSX (Carbon).

The IEMSR follows development work by UKOLN and ILRT on the MEG MSR (funded by JISC and BECTA, 2002). The IEMSR project makes a significant departure from this base line by attempting to map DC and LOM data models and to allow for the creation of single

MSR. This is a welcome development by the user community represented on the project and should help with developing interoperability standards within the evolving JISC IE.

Within the boundary of the project partnership there appears to be an implied vision of the user community centred on several functional groups and stakeholders (see section 2.3.2). The project has maintained limited engagement with stakeholders to date. This is a sensible approach given the delay in Registry development. At this early stage of prototyping wider stakeholder involvement could do more damage than good. However, it is important for the project to consider a roadmap of development which identifies points at which the Registry is given exposure to other stakeholders. A mapping of user and usage scenarios would help focus follow-on development and to prioritise requirements.

The user representation on the project has yet to realise tangible benefits from the project. These are not likely to accrue until the MSR becomes an operational service. However, it is still important to continue to collect input. Input from both end users and their representatives would be valuable during a next phase of development.

### 4.3 Sustainability

In a recent study by ESYS for JISC on Sustainability models for Common Services in the Information Environment, a number of issues were highlighted which are relevant to IEMSR, both in this current phase and in a follow-on development phase:

- Development projects are not generally geared to service delivery and delivering “industrial strength” infrastructure services
- Many see progression to JISC Service status as the default option however JISC budgets cannot sustain an ever-increasing service portfolio
- Budgets do not cover the project-to-service transition period, particularly building critical mass of users
- During development, project deliverables may be overtaken by other developments in the commercial sector and resources are not always available within the project to keep up with such parallel/competing initiatives
- Embedding project outcomes in other IE and JISC services needs support

The JISC approach for the IEMSR (and the IESR) is different to that for other development programmes in that this service has been identified as a specific requirement for the IE so further JISC investment is more likely than for a prototyping or experimental project. The IEMSR will be part of the IE infrastructure and should not be expected to become self-sustaining through commercialisation. Nevertheless, it will have to meet certain criteria to become a service and have a business plan to support its launch and future maintenance and development.

Features of a sustainable service in the JISC context include:

- Clear market need
- Offer benefits compared to competing offers
- Cost effective service delivery mechanism (including marketing)
- Can be non-profit
- Skills available in team to develop and maintain
- Interoperable with both commercial systems used by HE/FE institutions and other IE components

At its current stage of development, the IEMSR is still in the early stages and most of the focus of the work is on the technical elements of the service. However the problems experienced already in establishing a clear marketing proposition – who will use the service

and why? – will need to be resolved quickly before the service can address the wider sustainability issues above.

The partnership model for the development phase already includes organisations that will be well placed to support a move to full service status. Each has a strong profile in the sector and access to priority user communities to support future marketing of the service. The host organisation for the IEMSR will need to be considered – many JISC Services are currently based in the Data Centres who can provide a comprehensive service delivery platform and related skills (although further support will be required to market the service effectively).

The IEMSR will depend on input from the community (as well as people using the content on the registry) and building up this support will be a key factor for future sustainability. The likely scale and nature of participation by metadata schema owners should be tested at an early date.

Although collaboration with other registry activities has been proposed, it is not clear whether this has taken place and whether there is sufficient budget allocated to this (or meetings with other related projects/initiatives across JISC). In a future phase, this will be important to developing a business case for a sustainable JISC service. JISC support should be sought to help prepare for embedding the IEMSR in the wider Information Environment.

A key area where JISC can provide such support is to mandate provision of metadata schema to the IEMSR by all relevant projects and services funded by JISC and to recommend its use before projects develop any new schema.

### 4.4 Project management

The project began in January 2004 and is due for completion in June 2005. The complexity of working with DC and LOM data models and the difficulty of obtaining clear requirements for m2m from other service providers introduced delay to the schedule of work. The lack of availability of ILRT development staff within the required timescale led to an inevitable compression of the window for development activities. Reaching agreement on the data models and functional requirements also took several iterations. Consequently it was not possible to demonstrate / test a fully functional MSR at the proposed date of the workshop (November 2004). A test workshop of a part-prototype was rescheduled and conducted in March 2005.

The main impact of these delays was the re-prioritisation and rescheduling of the development timetable. It will be difficult for the project to meet all the original objectives and accommodate all the feedback captured during the workshop in the next version of the MSR prototype with only three months left to run on the contract.

The relationship between all project participants (UKOLN, ILRT, CETIS and BECTA) seems to have worked well. Regular technical and project meetings have been vital in maintaining momentum and providing opportunities for the user organisations to provide input and feedback.

# 5 RECOMMENDATIONS

This section presents a set of recommendations to the project team to help consolidate the closing project activities and to guide future development work.

1. Conduct a mapping of users and usages to help improve the focus and prioritisation of future developments and help target dissemination activities.

2. Develop a more focused business case for completing the development of a pilot Registry service. This should involve the clarification of users and usages (as suggested above) and a clearer definition of potential benefits that would be delivered by a pilot IEMSR service as well as estimates of the costs to complete the work.

3. Review the range of current team skills and consider including business/marketing skills at early stage to help develop a roadmap for deployment and to scope dissemination activities.

4. Enlist JISC help to engage development community on a wider level to stimulate interest with a pilot IEMSR service.

5. Consider identifying outline costs required to scale up to a full operational service.

## APPENDIX A: List of stakeholders consulted

**IEMSR project team**

| | |
|---|---|
| Rachel Heery | UKOLN, University of Bath |
| Pete Johnston | UKOLN, University of Bath |
| Dave Beckett | ILRT, University of Bristol |
| Nikki Rogers | ILRT, University of Bristol |
| Simon Price | ILRT, University of Bristol |

**User representation**

| | |
|---|---|
| Lorna Campbell | CETIS, Assistant Director |
| Phil Barker | CETIS, Metadata and Digital Repository SIG Coordinator |
| Barry Kruger | Becta, Head of Content Division, National Grid for Learning |
| Peter Johnston | Becta, Content Division |

**JISC project / service representation**

| | |
|---|---|
| Leona Carpenter | JISC, Shared Services Programme Manager |
| Debra Hiom | SOSIG Director, ILRT University of Bristol |
| Ann Apps | ISER Interface Design, MIMAS |
| Moira Massey | JORUM Project Manager, MIMAS |
| Adrian Stevenson | JORUM Service Definition & Development Manager, MIMAS |