JISC DEVELOPMENT PROGRAMMES

JISC IEMSR PROJECT PLAN

Project Acronym	IEMSR	**Project ID**	IEMSR Phase Two
Project Title	JISC IE Metadata Schema Registry		
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Lead Institution	UKOLN, University of Bath		
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Partner Institutions			
Contributing Institutions	CETIS Becta British Library		
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V1.0	2005-11-15	Correct typos

1. Background

The JISC IE Metadata Schema Registry (IEMSR) project is funded by JISC through its Shared Services Programme. The IEMSR project is developing 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. The IEMSR will act as the primary source for authoritative information about metadata schemas recommended by the JISC IE Standards framework.

The JISC IE Metadata Schema Registry project phase one came to the end of 18 months funding in June 2005. This project plan covers phase two of the project from July 2005 to end September 2006. Partners in phase one of the project have been UKOLN (University of Bath) and ILRT (University of Bristol). CETIS and Becta have acted as non-funded associate partners representing the IEEE LOM community. Due to changes in the costing model at ILRT, level of funding, and potential changes in approach to development, phase two will have UKOLN as the sole funded partner sub-contracting development work as appropriate. In addition the project will include one more non-funded associate partner to represent the DCMI community, the British Library, represented by Robina Clayphan. Robina has demonstrated engagement with the project and is exploring the implementation of a metadata schema registry within the British Library.

During the first phase 2004/5 the project achievements have been to produce a full set of documentation including usage scenarios, functional requirements and data models. These have supported development of the following IEMSR service components:

- Data creation tool
- Registry server
- Registry Web site

A small set of data was also created for indexing by the server.

A workshop was held in March to evaluate the IEMSR service and provide feedback on requirements. A formative evaluation report was prepared by Oliver Greening at ESYS on the basis of the deliverables and workshop.

The evaluation report recommended further work on the business case for the registry, analysing required functionality and mapping requirements to service provision. In order to facilitate this the project will need to progress the development of the IEMSR service components to provide a realistic range of functionality as outlined in the user requirements specification, and to provide a more streamlined Web interface. The project will also respond to questions as to how a schema registry would fit with the JISC Standards Catalogue and Framework activities.

2. Aims and Objectives

The IEMSR project aims to progress development of a metadata schema registry as a shared service within the JISC Information Environment. The IEMSR project is building on the work of previous projects which have explored provision of information about metadata at the level of data elements, element sets or application profiles. The MEG Registry project, funded by JISC and Becta in 2002, developed an RDF-based registry and schema creation tool. The IEMSR project is re-engineering the MEG software to accommodate the IEEE LOM, supporting ongoing cooperation between the Dublin Core and IEEE LOM standardisation communities.

Metadata schema registries enable the publication, navigation and sharing of information about metadata. The Registry project is scoped to target the UK education community where both Dublin Core (DC) and IEEE Learning Object Metadata (LOM) standards are used to build schemas. It will allow various initiatives within the JISC IE to publish "application profiles" of these standards in a registry, making them available to others. This provides a concrete way of encouraging sensible uniformity alongside necessary divergence.

It is anticipated that the development of the Metadata Schema Registry will begin to deliver the following benefits:

- Single point of access for the UK FE/HE community to information about terms used in DC and IEEE LOM metadata
- 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 improved communication between those JISC projects and services using the DC standard and those using the IEEE LOM standard

Over the next 18 months the main objectives are to:

- Ensure the IEMSR meets user requirements
- Provide a more focused business case for the registry service.
- Enhance the registry server and the APIs it offers to support
  (a) the requirements of the registry Web interface
  (b) the requirements of other applications/services
  (c) the administration of the registry server itself
- Enhance the schema creation tool to a standard whereby it can be evaluated by users
- Enhance the registry Web interface to a standard whereby it can be evaluated by users
- Liaise with the JISC Standards Catalogue activity to ensure that the information provided by the Standards Catalogue on metadata standards/specifications is consistent with the data held/provided by IEMSR.
- Liaise with the JISC Framework activity to ensure that the outcomes of IEMSR project regarding the functions of a metadata schema registry are integrated with the Framework

3. Overall Approach

3.1 Critical success factors

- Managing user expectations
- Establish good communication with potential users to achieve effective requirements gathering
- Prioritise functional requirements to ensure realistic software development schedule

3.2 Methodology

To review how the IEMSR meets user requirements with particular emphasis on balancing requirements for a Web interface with requirements for a m2m interface. Mapping users and usages will inform the creation of scenarios. The mapping and scenarios will improve the focus and prioritisation of future developments and help target dissemination activities. In

addition the mapping and scenarios will provide the basis for a more focused business case for the registry service. Phase two of the project will deliver a clearer definition of the functions that would be delivered by a pilot IEMSR service, and the benefits to users. It is important that a clear definition of the scope and functions of the Registry is disseminated to stakeholders as a result of this process.

To ensure the Registry software is of a standard whereby users can evaluate the demonstrator service. This will be done by specifying and carrying out software development to enhance the Registry components to meet prioritised requirements identified in phase-one functional requirements, prioritised according to the mapping exercise outlined above.

To evaluate the Registry Web interface and schema creation tool by user testing within small group meetings (at least two) with both informal and questionnaire based feedback.

To review the administrator functionality for the registry server and develop the administrator interfaces required.

To ensure stakeholders' expectations for the service are realistic. This will be done by means of more targeted dissemination aimed at stakeholder groups.

The project will liaise with both the JISC Standards Catalogue and JISC Framework activities to ensure the project's work is integrated with these activities.

3.3 Important issues to be addressed

The IEMSR currently focuses on term-level navigation of application profiles of standards mandated by the JISC standards framework i.e. DC and IEEE LOM, providing access to information about the definitions and characteristics of individual terms used in these metadata standards and associated application profiles.

The two standards (DC and IEEE LOM) have different, incompatible data models: DC uses a statement-based model; whereas IEEE LOM uses a document-based model of hierarchical containers. The IEMSR tools (at least, the Web site and the data creation tool) have been developed to work specifically with these two different data models.

The IEMSR has developed a single registry server indexing data about both DC and IEEE LOM based application profiles, providing a single Web interface to this registry and a single schema creation tool. At times this approach has been questioned from within the project. The two standards (DC and IEEE LOM) have quite different data models. DC is based on simple attribute:value pairs amenable to expression as 'properties' of resources using RDF; whereas IEEE LOM is based on a hierarchical document-like model amenable to expression using XML. The perceived benefits of developing a single tool for both standards based are

- integrated tool for both standards will encourage greater awareness of both standards within the JISC community

- potential gains in longer term if single development 'platform' is used

- less overhead developing divergent separate tools (though this is counter-balanced by effort required to create single tools!)

However the downside is that specification of user interfaces for an integrated tool has and will require very detailed work, which is both time-consuming and requires a high level of expertise.

Overall in phase one the complexity of the software development work has been under-estimated. Within phase two we intend to review our approach to software development based on a review of user requirements. The software development approach will be evaluated with regard to technical and business criteria. The overall aim is to develop existing software to the level at which it can be effectively evaluated by potential users.

Initial prioritised development work within Phase 2 will be carried out by ILRT costed on a consultancy basis. Informed both by initial outcomes of WorkPackage 1 review of user requirements, and the inevitable constraints of availability and commitment priorities, we will consider which of the following approaches is most appropriate for further work:

- Progress software development in-house at UKOLN
- Subcontract all software development to ILRT

3.4 Scope and boundaries of work

The project is not intended to include comprehensive registration of terms within 'controlled vocabularies' and subject schemes associated with DC and IEEE LOM. The Registry will describe the vocabulary as a whole rather than individual terms.

4. Project Outputs

Informed by feedback from stakeholders (user communities and JISC IE team) and the evaluation report, phase two of the project will focus on the following:

1. A *mapping of users and usages* will inform the creation of *scenarios* to improve the focus and prioritisation of future developments and help target dissemination activities. This will provide the basis for a more focused business case for the registry service. This should enable a clearer definition of potential benefits that would be delivered by a pilot IEMSR service and will contribute to formulating a business plan.

2. A business plan will be formulated by Oliver Greening, the consultant who carried out the formative evaluation for phase one of the project. The aim is to provide an outline proposition and marketing plan to guide the refinement of the IEMSR developed in Phase one. The process to be followed is summarised below:

Product / Service audit
- Conduct marketing audit:

Product / Service strategy:
- Perform audit analysis – strengths, weaknesses, opportunities, threats
- Define IEMSR positioning strategy – New / existing market? Product development / diversification?

Product / Service plan:
1. Establish marketing objectives and action plan – target stakeholders and milestones
2. Define marketing mechanisms

3. Specify and carry out software development to *enhance registry software (i.e. Web interface to registry, registry server, schema creation tool) to meet prioritised requirements* identified by user requirements originally identified in phase one functional requirements, amended and prioritised according to the mapping exercise outlined above. In phase two there will be less emphasis on establishing machine to machine usage.

4*. User testing and evaluation* of the Web interface and schema creation tool by means of meetings and questionnaires.

5. *Work with JISC standards catalogue and JISC framework activities* by providing appropriate links between Registry and the JISC Standards Catalogue; and by providing use cases to the Framework activity.

6. *Dissemination* of project progress by publication and presentations

7. *Peer-review report* on the project's technical approach.

5. Project Outcomes

Within the context of the JISC IE, an effective infrastructure for management of metadata is vital for cost effective delivery of services. A registry service is a basic 'middleware' component for metadata management and it is important that the major funding bodies take a lead in the development of such a service. The project will be pro-active in collaboration with other registry activities.

The intention is that the less tangible outcomes of the project will be

- further work on modelling of application profiles. The IEMSR is furthering understanding of issues arising from attempts to model DCMI and IEEE LOM application profiles.

- providing a focus for joint working between DCMI and IEEE LOM users within JISC. This aids communication and understanding between digital library and learning communities.

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

Development of the JISC IE Metadata Schema Registry will be of interest to other organisations that are establishing schema registry as a means to enable re-use and interoperability between schemas. The project will be pro-active in collaboration with other registry activities.

6. Stakeholder Analysis

Stakeholder	Interest / stake	Importance
Schema creators	Discovery and re-use existing application profiles or individual terms	High

Metadata schema creators and maintainers within JISC projects and services using (application profiles of) the DC and IEEE LOM Standards.	Easy access to information about existing schemas and application profiles	High
Potential users of 'JISC IE shared infrastructure services' within JISC projects and services	Access to machine readable schemas and application profiles deployed within JISC IE Publishing machine readable schemas and application profiles used within implementations	High
Funders	Encourage re-use of existing application profiles and terms to save duplication of effort and promote interoperability Promotion, quality assurance and preservation of schemas and application profiles	High
End-users of information systems using application profiles	Effective management of metadata	High
Other registries	Re-use application profile models, to re-use source code	Medium
Commercial suppliers of software products and services to JISC IE	Access to machine readable schemas and application profiles deployed within JISC IE	Medium

7. Risk Analysis

Risk	Probability (1-5)	Severity (1-5)	Score (P x S)	Action to Prevent/Manage Risk
Staffing	3	4	12	Flexibility regarding schedule
Organisational	2	1	3	Lead partner in control
Complexity of software development	4	4	16	Review and monitor progress Undertake peer review
Complexity of developing single tools to fulfil requirements	3	4	12	Set realistic expectations by means of scenarios, prioritise requirements, manage

across DCAPs and IEEE LOM APs				expectations by dissemination
Sub-contractor's availability	3	4	12	Start negotiations early
Legal	1	4	4	Ensure no IPR issues

8. Standards

References to standards the project will be using can be found alongside references to additional background documentation on the project web pages see http://www.ukoln.ac.uk/projects/iemsr/background/

Specifications that will be used to inform description of schemas and application profiles include:

RDF Vocabulary Description Language 1.0: RDF Schema (W3C Recommendation)
http://www.w3.org/TR/2004/REC-rdf-schema-20040210/

RDF Concepts and Abstract Syntax (W3C Recommendation)
http://www.w3.org/TR/2004/REC-rdf-concepts-20040210/

RDF/XML Syntax Specification (Revised) (W3C Recommendation)
http://www.w3.org/TR/2004/REC-rdf-syntax-grammar-20040210/

RDF Semantics (W3C Recommendation)
http://www.w3.org/TR/2004/REC-rdf-mt-20040210/

DCMI Abstract Model
http://www.dublincore.org/documents/abstract-model/

SPARQL Query Language for RDF (W3C Working Draft 21 July 2005)
http://www.w3.org/TR/2005/WD-rdf-sparql-query-20050721/

The following guidelines have informed work on the Registry:

CEN Workshop Agreement: Dublin Core Application Profile guidelines
CWA14855

CEN Workshop Agreement: Guidelines for machine-processable representation of Dublin Core Application Profiles
CWA15248

The scope of the IEMSR will be the two standards for resource description recommended by the JISC and application profiles associated with those standards that are deployed within the JISC and wider education community:

Dublin Core Metadata Element Set, Version 1.1: Reference Description
http://dublincore.org/documents/dces/
DCMI Metadata Terms
http://dublincore.org/documents/dcmi-terms/

Expressing Simple Dublin Core in RDF/XML. (DCMI Recommendation) http://dublincore.org/documents/dcmes-xml/

Expressing Qualified Dublin Core in RDF/XML. (DCMI Proposed Recommendation) http://dublincore.org/documents/dcq-rdf-xml/

Guidelines for implementing Dublin Core in XML. (DCMI Recommendation) http://dublincore.org/documents/dc-xml-guidelines/

IEEE Standard for Learning Object Metadata (Approved Publication of IEEE)
http://ltsc.ieee.org/wg12/par1484-12-1.html

Standard for XML binding for Learning Object Metadata data model (Modified Revision Project)
http://ltsc.ieee.org/wg12/par1484-12-3.html

Standard for Resource Description Framework (RDF) binding for Learning Object Metadata data model (New Standard Project)
http://ltsc.ieee.org/wg12/par1484-12-4.html

The project will strive to follow good practice regarding accessibility standards and guidelines, for example by following HTML W3C html 4.01 (http://www.w3.org/TR/1999/REC-html401-19991224/) and using W3C WAI guidelines to double A conformance (http://www.w3.org/WAI/WCAG1AA-Conformance).

9. Technical Development

The technical development will follow the open source development model, using existing software from the MEG and CORES projects along with appropriate third party open source code. The development will be done in the open with public access to the source code and project information. The development will follow the standard practice of gathering user requirements leading to a specification of functional and non-functional requirements. These will be used to derive technical
requirements that will drive the choice of software and use of other open source materials. The development will proceed with the partners having equal access to the CVS area.

10. Intellectual Property Rights

IPR in any software delivered by the project will be assigned according to the Consortium Agreement. All software delivered by the project will be covered by an OpenSource Licence. IPR in the content of the registry (schemas, application profiles, annotations) will remain with the creators. No additional IPR issues are envisaged.

11. Project Partners

11.1 Lead Partner

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11.3 Sub-contractors

Software development:
ILRT, University of Bristol, have agreed to carry out software development subject to recruitment of staff planned in December. This would provide some continuity with phase one, although the main software developer for IEMSR phase one, Dave Beckett, has now moved on. ILRT would charge for effort on a consultancy basis. Given the risk of delay due to recruitment discussions are continuing within UKOLN regarding the possibility of bringing development of some IEMSR components in-house.

Market proposition and marketing plan:
Oliver Greening at Greening Consulting has agreed to build on the work he undertook in phase one of the project to deliver a marketing proposition and marketing plan.

Peer review of technical approach:
Potential candidates to carry out a peer-reviewed technical evaluation are Alastair Miles, CCLRC; Matthew Dovey, Oxford; Martin Morrey, Intrallect.

12. Project Management

The JISC IE Metadata Schema Registry will be project managed by Rachel Heery at UKOLN. Project administration will be carried out with the assistance of Jenny Taylor working as a Project Assistant. Project management will be based on the JISC development programme guidelines. UKOLN will be responsible for monitoring activities to ensure proper execution of the work programme to schedule and budget. Project management techniques will be of a modest level of complexity, in keeping with the scale of the work involved,

Communication: email, phone conferences, private web pages
Project meetings: regular meetings
Schedule: Gantt chart
Budget: interim reports

13. Programme Support

The IESMR is positioned within the JISC IE Shared Service programme. It would be helpful for the JISC programme manager to ensure there is good communication between projects within this programme, and between this programme and the wider JISC project community. Cross programme meetings will be useful means to achieve this.

In order to engage the user community, the JISC Executive have agreed to consider funding JISC projects and services to register their application profiles in the Registry. The project will inform the Executive when it will be appropriate to do this. The Executive will also consider engagement with the Digital Repositories Programme.

As the IEMSR will offer m2m 'infrastructure services' it would be useful for the programme manager also to encourage communication between IEMSR and appropriate JISC services who might be potential users. IEMSR phase one experienced difficulty in getting focused engagement from a potential m2m user.

14. Budget

see Appendix A

15. Work packages

The project will run for 15 months from beginning of July 2005 to end September 2006.

WP1 Project management

Project management and partner co-ordination will be provided by UKOLN and will be achieved by quarterly project meetings. Communication between partners will be supported by a dedicated project discussion list and informal methods. Financial reports will be supplied by the UKOLN Resources Co-ordinator. Established project management procedures as recommended by JISC will be followed to ensure timely completion of deliverables and an effective outcome. Staff supervision will be provided by Rachel Heery at UKOLN.

Deliverables

Quarterly project meetings

Regular technical meetings with sub-contractors
Project reporting

WP2 User requirements

Creating *scenarios* to inform *a mapping of users and usages* to help improve the focus and prioritisation of future developments and help target dissemination activities. This will provide the basis for *a more focused market proposition and marketing plan for the registry service*. This should enable *a clearer definition of potential benefits* that would be delivered by a pilot IEMSR service.

Work with standards and framework activities within JISC to form appropriate links between Registry and JISC Standards Catalogue; and to provide use cases to the Framework activity.

Deliverables

IEMSR Usage Scenarios
Market proposition and marketing plan for Registry Service
Initial definition of IEMSR service within context of JISC Framework

WP3 Registry development

(Partners: UKOLN lead, ILRT sub-contractor)

Specify completion of *prioritised requirements to data creation tool and registry Web interface*.
Software development to *complete registry server, data creation tool and registry Web interface to meet prioritised requirements*.

Carry out *user testing and evaluation* by means of meetings and questionnaires.

Deliverables

Specification for completion of prioritised requirements to data creation tool and registry Web interface
Enhanced registry server
Enhanced data creation tool
Enhanced registry Web interface
Report on user testing and evaluation

WP 4 Dissemination and evaluation

Dissemination of project progress by publication and presentations
Carry out evaluation of project outcomes, sustainability and project management.
Peer-review report on the project's technical approach

Deliverables

Peer-review report on the project's technical approach

16. Evaluation Plan

Within phase one various aspects of the IEMSR were evaluated: outputs and stakeholder benefits, sustainability and project management. During phase two evaluation will focus on the appropriateness of the project's technical approach to delivering the project objectives. The technical review will be in the form of peer review from technical experts in May 2006.

17. Quality Assurance Plan

Explain the quality assurance procedures you will put in place to ensure that project outputs comply with JISC technical standards and best practice, and what will constitute evidence of compliance.

Timing	Compliance With	QA Method(s)	Evidence of Compliance
June2006	Fitness for purpose	Formulation of market proposition and marketing plan	Market proposition and marketing plan
May 2006	Technical design	Peer reviewed technical evaluation	Report
	Adherence to specifications	Progress report to JISC	Six monthly
	Adherence to standards	Progress report to JISC	Six monthly
	Accessibility legislation	Progress report to JISC	Six monthly

18. Dissemination Plan

Timing	Dissemination Activity	Audience	Purpose	Key Message
March 2006	Presentation to	Digital Repositories Programme	Awareness raising	Benefits of declaring and re-using application profiles
June 2006	Presentation and demonstration	Associate partners	Potential for deployment of software	Benefits and Functionality
July 2006	Presentation and demonstration	JISC projects and services	Advocacy: benefits and market proposition and marketing plan	Encourage input of data

19. Exit/Sustainability Plan

Project Outputs	Action for Take-up & Embedding	Action for Exit
Software tools	Dissemination and advocacy	Make available as OSS for

		download from Sourceforge
Registry Web Service	Requires ongoing maintenance	Negotiate sustainability of service

List any project outputs that may have potential to live on after the project ends, why, how they might be taken forward, and any issues involved in making them sustainable in the long term.

Project Outputs	Why Sustainable	Scenarios for Taking Forward	Issues to Address
Registry service	Of benefit to range of stakeholders	Shared service	Market proposition and marketing plan