JISC IE Metadata Schema Registry

A proposal submitted to the JISC by UKOLN, University of Bath, with ILRT, University of Bristol, with contributions from CETIS and Becta

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1. Introduction

Metadata schema registries enable the publication, navigation and sharing of information about metadata. This is a proposal to build a JISC IE Metadata Schema Registry as a shared service within the JISC Information Environment (JISC IE). The Schema Registry will act as the primary source for authoritative information about metadata schemas recommended by the JISC IE Standards framework. The Registry will be targeted at the spectrum of education communities, providing a service sufficiently generic to handle schema based on both the Dublin Core and IEEE LOM. This proposal recommends that a pilot registry is developed and evaluated over 18 months commencing January 2004. Partners in the project are UKOLN, ILRT. CETIS and Becta will contribute to the projet in different areas.

Metadata within the JISC IE is based largely on two key standards - Dublin Core (DC) and the IEEE Learning Object Metadata (IEEE LOM). The MEG Registry project, funded by JISC and Becta in 2002, developed RDF-based registry and schema creation tools. These tools were readily usable with Dublin Core but less so with the more hierarchical model of IEEE LOM. The JISC IE Metadata Schema Registry will re-engineer the MEG software to accommodate the IEEE LOM format, supporting ongoing cooperation between the Dublin Core and IEEE LOM standardisation communities.

The Registry will provide the JISC IE with a single point of referral for recommended schemas. It will allow various initiatives within the JISC IE to publish application profiles in a common registry, making them available to others. This provides a concrete way of encouraging sensible uniformity alongside necessary divergence. It helps avoid unnecessary duplication of effort, and supports sharing of common approaches.

The JISC IE Metadata Schema Registry will build 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 emergence of Semantic Web and Web Services technologies has encouraged the structured representation of element sets as machine-readable schemas that can be manipulated by software tools.

The overall aim of metadata schema registries is to provide users, human or software, with the means to navigate and access schemas. A managed schema registry becomes an authoritative source for information about metadata, and an access point to schemas for re-use. Establishing a pilot Metadata Schema Registry will leverage previous work by project partners in this area, and will progress setting up a shared infrastructure for the JISC IE. The benefits of metadata schema registries are in summary:

- 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 project will deliver a Web interface that allows people to browse existing schemas and application profiles based on DC and IEEE LOM, and create new applications profiles. The project will deliver

machine to machine (m2m) access to XML schemas associated with application profiles, and to RDF schemas where appropriate.

2. Background to Metadata Schema Registries

The JISC IE Metadata Schema Registry will build on previous work in the DESIRE, MEG and CORES projects[1]. The MEG Registry project was funded by JISC and Becta in 2002/3 as a short 'light-weight' project to prototype registry and schema creation tools targeted at the Metadata for Education Group (MEG). Partners in the project were UKOLN (project management, data modelling, user requirements) and ILRT (software design and development).

The MEG Registry project provided an opportunity to implement a prototype schema registry based on RDF specifications and tools. The aim was to seek a more sustainable and scaleable solution than had been available to previous projects. UKOLN and ILRT seeded the registry with Dublin Core schemas and experimented with registering IEEE LOM schemas. There was limited evaluation of these tools by practitioners and implementers. More recently the software was enhanced within the EC funded CORES project to include a facility for simple annotation. The software is available now as open source code.

Various issues emerged from the MEG project. Firstly, the ***need for descriptive information about schemas and application profiles.*** Users require basic information about domain areas in which a schema or application is used, details of deployment, links to documentation, available versions etc. This metadata, not included in MEG, will be provided by the JISC IE Metadata Schema Registry.

More significantly it emerged there were ***difficulties in accommodating DC and IEEE LOM metadata formats in one registry due to differences in their underlying models***. The constraints of the MEG registry data model and RDF binding meant that much of the hierarchical aspects of the IEEE LOM element set were stripped away and represented within the MEG registry by a 'flattened' model. The difference between the hierarchical LOM model and the statement-based RDF model has been acknowledged by Mikael Nilsson in his account of issues associated with this binding[2].

The JISC IE Metadata Schema Registry is intended to provide users with human readable Web pages about both DC and IEEE LOM schemas and application profiles, with links to appropriate XML schemas. This means the registry will need to be sufficiently expressive to reflect the structure of both IEEE LOM and DC schemas. Alternative approaches would be to adapt the data model within the registry to enable description of the IEEE LOM XML tree structures, or to provide from the same Web interface a 'partitioned' database for DC and IEEE LOM schemas and application profiles.

There is a ***requirement to point from application profiles to existing external XML schemas***. Many applications are based on XML, and IEEE LOM metadata applications in the JISC IE typically use an XML binding. Although a registry based on RDF can provide required semantics, applications may require a link or pointer to an XML schema.This will be provided by the JISC IE Metadata Schema Registry.

There is a ***need to enhance the schema creation tool***. Within the initial DESIRE project, UKOLN staff created entries themselves for schemas in the registry. This is not a scaleable solution in the

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[1] DESIRE <http://desire.ukoln.ac.uk/registry/index.php3>

CORES <http://www.cores-eu.net/>

MEG Registry project <http://www.ukoln.ac.uk/metadata/education/regproj/>

[2] Nilsson, Mikael. Semantic issues with the LOM RDF binding, 2003-01-15.

<http://kmr.nada.kth.se/el/ims/md-lom-semantics.html>

longer term. The MEG project developed a schema creation tool to be used in an interactive way with the MEG Registry. Initial evaluation of this tool indicated that usability could be improved, and that schema creators require support in the form of documentation and workshops. These requirements need to be addressed by the JISC IE Metadata Schema Registry. Creators of IEEE LOM application profiles will require significant changes to the tool to accommodate 'nested elements' within LOM; alternatively, a distinct facility could be used for creation of IEEE LOM application profiles.

3. Objectives of JISC IE Metadata Schema Registry

The aim of the project is to develop a pilot registry service within the JISC Information Environment providing information about DC and IEEE LOM metadata schemas and application profiles. The Schema Registry will build on the MEG Registry work but make significant enhancements to the software and user interface to accommodate the IEEE LOM model. This work will be carried out with a view to accommodating other metadata schemas in future. When experience has been gained, use of the Registry by other interested parties within the Common Information Environment might be encouraged.

The objectives of the JISC IE Metadata Schema Registry will be to

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

The Registry will be hosted at UKOLN and presented to human users via a Web interface, although differences in the underlying DC and IEEE LOM models will require different constraints in creating IEEE LOM or DC application profiles. The Registry Web Interface will allow human users to create new schemas and application profiles, and to browse existing application profiles.

3.2 Provide machine to machine access to DC and IEEE LOM schemas and application profiles

The Registry will provide an API through which applications can query the data indexed by the registry. Data returned will include locators for XML Schemas where available. The API will be implemented as a Web Service using either a REST- or SOAP-based interface (or both). Such a Web API enhances the use and re-use of information stored in the registry and provides programmatic access to the information.

3.3 Investigate additional validation service

The potential of an added-value validation service will be explored, with a view to implementation at a later phase of development. This service 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).

Validation scripts are already in operation on stand-alone applications such as the Curriculum Online metadata tagging tool, developed by Becta. The project would seek to evaluate the potential of these and others within the scope of the Schema Registry.

3.4 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.

In order to achieve the above objectives

- UKOLN, CETIS and Becta will jointly gather user requirements and produce a user requirement specicifcation.
- UKOLN, CETIS and ILRT will collaborate on modelling to enhance support of the IEEE LOM and to enhance the functionality of the Registry to link to XML schemas.

- ILRT will enhance the schema creation tool and registry software in accordance with user requirements incorporating an enhanced data model, support for IEEE LOM, and links to XML schemas.

- All partners will collaborate to improve usability of tools based on user requirements and the evaluation process

- An independent party will carry out an evaluation of the Registry and schema creation tools.

4. JISC IE Metadata Schema Registry Users

The Metadata Schema Registry will make element sets and application profiles available both to humans (for query and consultation) and to software (for federating, merging, or translating metadata). Registries address the needs of various groups within the JISC IE community:

- ***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; and
- ***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.

As well as serving specific user groups the registry acts as a focus for ***promotion*** of recommended schemas and application profiles within the JISC IE. The registry assists ***quality assurance*** by supplying authoritative versions of schemas that can be used within quality control tools, for example to validate instance metadata. If required, the Registry might provide an associated central store for XML Schemas developed within the JISC IE supporting ***preservation*** by giving a persistent record of versions of schemas

5. Impact

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.

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 ultimately harmonisation of schemas. The project will be pro-active in collaboration with other registry activities such as

- DCMI distributed registry (Rachel Heery, UKOLN, co-chairs this activity and there are existing implementations at OCLC; University of Goettingen, Germany; ULIS, Tsukuba, Japan; UKOLN

- OAI registry (Jeff Young, OCLC)

- SIMILE project (Andy Seaborne, HP Labs Bristol)

Both CETIS and UKOLN have been involved in European workshops supported by CEN/ISSS (European Committee for Standardisation - Information Society Standardization System). Rachel

Heery at UKOLN has co-authored a CEN Working Agreement 'DCMI Application Profile Guidelines' [3] which will inform data modelling work within the Registry .

The project is not intended to include registration of 'controlled vocabularies' and large scale subject schemes (although it may include short term lists). However experience of establishing a Metadata Schema Registry should inform plans for registering controlled vocabularies and subject schemes, and should contribute to forward thinking regarding a JISC IE registry for terminology services.

CETIS have been involved in work related to the registry of controlled vocabularies. The CEN/ISSS Work Shop for Learning Technologies recently funded a Taxonomies and Vocabularies project, led by European Schoolnet, that included independent experts from CETIS, the University of Vigo and CEDEFOP. This project produced two outputs that will significantly enhance the semantic interoperability of learning object metadata records: a registry of taxonomies and vocabularies relevant to a European Learning Society[4], and a comprehensive report outlining the use of vocabularies with learning object metadata.

6. Methodology

Initial development will be based on recommendations emerging from evaluation of the MEG registry. These included enhancements to the data model and improved usability. Further work will be required to gather user requirements. This will be done in collaboration with CETIS and Becta who will facilitate access to learning and education communities, and with selected JISC projects and services. The project will achieve its objectives by undertaking work

- To gather user requirements from the education and digital library communities, with support of user organisations (Becta, CETS, identified JISC services).
- To refine the DC/RDF data model underlying the registry and schema creation tool, with a view to supporting the IEEE LOM hierarchical model, taking into account user requirements.
- To specify enhancements to the registry and schema creation tool software according to the new data model.
- To specify improvements to the usability and presentation of the CORES schema creation tool and registry based on user requirements.
- To collaborate with applications within digital library and education communities to demonstrate m2m use of registry, with support of user organisations (Becta, CETIS, identified JISC projects and services).
- To collaborate with other schema registry and ontology activities to explore common approaches, solutions and to track developments.
- To draw up a policy framework for the registry addressing quality assurance, persistence and content.
- To organise a workshop targeted at potential users of the registry, exploring the role of schema registries, connections with other registry and directory activity.

[3] Baker, Thomas *et al.* Dublin Core Application Profile Guidelines.Final draft CWA September 2003 <ftp://ftp.cenorm.be/public/ws-mmi-dc/mmidc076.zip>

[4] <http://www.cenorm.be/isss/LT-vocabulary/vocrep.html>

7. Project Outputs

7.1 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

7.2 Metadata Schema Registry

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.

7.3 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. If that is the case, consideration will be given to the use of generic XML editing tools to prepare RDF/XML documents for submission to the registry.

7.4 Demonstrate m2m usage of registry

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.

7.5 Validation service case study

The potential of an added-value validation service will be explored, with a view to implementation at a later phase of development. This service 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).

Validation scripts are already in operation on stand-alone applications such as the Curriculum Online metadata tagging tool, developed by Becta. The project would seek to evaluate the potential of these and others within the scope of the JISC registry.

7.6 Registry policy framework

In order to encourage confidence in the registry policies are required regarding persistence of the registry service and schema content, collection scope and quality assurance

While acknowledging that a number of policy issues are more relevant to a 'production' registry, concerns about persistence are particularly significant even at the pilot stage. Schema creators and system developers do not feel able to commit any significant efforts to creating and registering schemas unless they have confidence in continuance of the registry. In order to commit time to gaining familiarity with the tools they need some assurance regarding future maintenance of the registry service, and future management of the content of the registry.

7.7 Guidance materials

Schema creators will need training and guidance materials to express their information models in a common form. The project will support users with guidance materials.

7.8 Evaluation report

An interim evaluation report will be produced by an external consultant mid-project.

7.9 Open source software maintenance

Software will be managed by ILRT in a centralised open source software environment such as SourceForge. SourceForge provides support management tools (Tracker) and release management using a Web-based file release system. Software will be made available using an appropriate licence.

8. Project Management

The JISC IE Metadata Schema Registry will be project managed by Rachel Heery at UKOLN. 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 relatively modest level of complexity, in keeping with the scale of the work involved.

9. Evaluation

Early within the development process project partners will identify the key benefits intended to result from the registry development, and will consider appropriate performance indicators. Budget has been set aside for evaluation to be carried out by an external consultant. The project will gain most from this formative evaluation if it can be carried out in stages or at least at mid-term, in order to inform further work. The external evaluation might usefully be done in conjunction with the workshop targeted at representatives from user groups. Final summative evaluation will be carried out by project partners and included in the final project report.

10. Dissemination of Project Outputs

A Project Web site will be created at the start of the project and will contain current information on activities, and links to work in progress. Links to relevant articles and projects relating to will be added. Presentations and publications derived from project work will also be available on the site.

Project progress will be presented at relevant conferences such as ECDL, DCMI International Metadata Conference, ALT-C, and relevant workshops, including any specific JISC Development Programme events. Particular attention will be paid to disseminating the work across both digital library and learning communities and to engage both groups in use of the registry tools.

11. Project partners

Core partners:

11.1 UKOLN

UKOLN, based at the University of Bath, is a centre of expertise in digital information management, providing advice and services to the library, information, education and cultural heritage communities.

UKOLN has significant experience of metadata, supporting interoperability between metadata schemas, and in metadata standardisation activities such as the DCMI. UKOLN's Interoperability Focus (Paul Miller and Pete Johnston) have worked closely with educational initiatives in the UK, establishing the Metadata for Education Group (MEG), and working closely with CETIS. UKOLN's support of the JISC IE technical architecture (Andy Powell) has led to involvement with IEEE LOM and IMS communities investigating the intersection between digital library and learning technologies.

UKOLN has researched publication of machine-readable metadata schemas, initially within the DESIRE project and later within CORES and MEG Registry projects.

UKOLN has broad experience in project management. Rachel Heery has managed several UK and European projects, as well as managing technical and development staff in her role as R&D team leader at UKOLN.

Rachel Heery

Rachel Heery is Assistant Director at UKOLN. Rachel has been involved in a number of projects over recent years in the field of metadata, resource discovery and information architectures, as well as contributing to UKOLN's work in support of the JISC IE technical architecture. She brings to this role wide experience of the implementation and development of information management systems in the commercial and library sectors. She has a particular interest in schema registries and application profiles, and she has worked recently on the JISC IE Services Registry. Rachel has been active in the development and management of Dublin Core and of the DCMI Registry activity.

Pete Johnston

Pete Johnston works in the Interoperability Focus at UKOLN and is concerned primarily with the exchange and reuse of information in the fields of Government, Education and Cultural Heritage. He has collaborated with the UK Centre for Educational Technology Interoperability (CETIS) and has been involved in the development of the MEG metadata schema registry for the UK Metadata for Education Group (MEG). Within the CORES project, Pete focused primarily on data modelling and the expression of application profiles in RDF. Pete has detailed expertise in XML and RDF and has co-authored DCMI recommendations on expressing Dublin Core in XML. Prior to joining UKOLN, Pete worked on a digital records management project based at Glasgow University Archive Services where he gained experience in various areas of markup technologies.

11.2 ILRT

The Institute for Learning and Research Technology (ILRT) of the University of Bristol works on multiple aspects of technologies in education through services, research, development, teaching and consultancy at local, national and international level. It operates several services in the digital library and online education community and does research and development in Web Services, usability, design, and accessibility with special expertise in the Semantic Web and Resource Description Framework (RDF) applied to these areas.The Institute is active in Web standards work as a member of the World Wide Web Consortium (W3C) and in particular the Semantic Web standards activity.The Semantic Web Advanced Development Europe Project (SWAD-Europe) is co-ordinated from ILRT and works on disseminating, developing, and deploying practical applications based on these technologies. The Institute staff have extensive experience in Open Source software development, technical dissemination and software release management which was used when ILRT jointly developed with UKOLN the original MEG Registry model and applications upon which the later CORES Registry work was based.

In this project, the ILRT will update the MEG Registry to include support for the IEEE LOM, XML Schemas and other W3C or related Web technologies. The Institute will use its design and development experience to jointly work on updating the applications using an Open Source approach with the other partners and community.

Dave Beckett

Dave Beckett is a Senior Technical Researcher at the ILRT working on the SWAD-Europe project. He worked on the original MEG project designing the model, schema registry and schema creation tools. He co-edits two of the updated RDF specifications as part of the W3C RDF Core Working Group and edited the DCMI Recommendation on expressing Simple Dublin Core in RDF/XML. Dave maintains a large RDF resource guide and is the creator of the Open Source RDF tools Redland and Raptor.

Contributors:

11.3 Becta

Becta is the Government's lead agency for ICT in education. Working to support the development of ICT in education throughout the UK, Becta's unique contribution is to combine knowledge of the needs of education with an understanding of the power of technology. As a UK agency, Becta supports all four UK education departments in their strategic ICT developments, facilitating knowledge

transfer among them in order to encourage innovation and improvement, and bring coherence and synergy to UK-wide developments.

Becta recognises the needs of different phases of education and works to develop coherence in ICT initiatives. Becta's work endeavours to be inclusive, aimed at using the potential of ICT to create educational opportunities and remove barriers to learning. To this end, Becta is engaged in Web standards activites across all phases, with active representation on national and international standards organisations, and supporting the development of UK initiatives such as Curriculum Online and NLN.

Barry Kruger

Barry Kruger is Head of Content at the National Grid for Learning and has been responsible for the development of national web portals such as the Virtual Teacher Centre and the Teacher Resource Exchange, both of which use Application Profiles based on IEEE LOM, and which, along with National Curriculum Online, were the building blocks of the Curriculum Online Application Profile and element set. He has developed the open source Curriculum Online metadata tagging application, and has represents Becta on MEG and BSI's IST 43 committee.

11.4 CETIS

The Centre for Educational Technology Interoperability Standards (CETIS) is a JISC funded distributed advisory centre that is managed by the Bolton Institute of High Education. CETIS' primary remit is to advise the UK FE/HE sector on the strategic, technical and pedagogic implications of educational technology interoperability standards, provide technical advice and support to FE/HE institutions, JISC research programmes and initiatives on the uptake and implementation of these standards and specifications. CETIS represents the interests of the FE/HE sector on a wide variety of international standards bodies including IEEE, IMS Global Learning Consortium and the CEN/ISSS Learning Technologies Workshop. In addition CETIS manages a series of special interest groups and fora that focus on learner information, enterprise, pedagogy, educational content, assessment, accessibility, metadata and digital repositories. CETIS plays an important role in developing application profiles of standards and specifications that are tailored to meet the requirements of the UK educational community.

Lorna M. Campbell

Lorna M. Campbell is an Assistant Director of the CETIS http://www.cetis.ac.uk/. She has been involved in developing and supporting the use of learning technologies to facilitate teaching and education since 1997. She has also played an active role in a variety of projects facilitating the reuse of interoperable educational resources. These include the Scottish Electronic Staff Development Library, the DNER and Learning Objects project and the CEN/ISSS WSLT Taxonomies and Vocabularies Project. She is also a member of the IMS Global Learning Consortium and regularly participates in the IMS Digital Libraries and Metadata Special Interest Groups.

Associated areas of research include the implementation of learning technology interoperability specifications and learning object metadata, the identification of common practice frameworks and development of application profiles and the use of educational classification systems and controlled vocabularies. Recently Lorna has contributed to the development of the UK Common Metadata Framework, an application profile of the IEEE LOM developed for use across UK educational sectors http://www.cetis.ac.uk/profiles/ukcmf/.

12. Summary of WorkPackages

The project will run from beginning of January 2004 to end June 2005.

WP1 Project management
(Partners: UKOLN lead)

Project management and partner co-ordination will be provided by UKOLN and will be achieved by an initial project start-up face-to-face meeting with all partners, followed 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, and Dave Beckett at ILRT.

Timescale: throughout project

WP2 Modelling and Usability
(Partners: UKOLN lead, CETIS, Becta)

UKOLN will lead requirements gathering in collaboration with CETIS, Becta and JISC projects and services. The focus will be to

- Define use cases for registry and schema creation
- Enhance Registry data model to accommodate IEEE LOM
- Specify RDF language for describing metadata schemas including IEEE LOM and DC Application Profiles
- Specify Web Interface requirements
- Specify m2m requirements

Early requirements will be gathered and fed into WP3, this will allow the technical development to proceed at an early stage in the project. There will be an iterative process which will inform development of an initial prototype which will be available in month 11 for a workshop of practitioners in the JISC/Becta/CETIS communities to be held in month 13. The workshop will inform any changes that are needed to the functional specification. A finalised functional specification will be delivered in month 15.

Timescale: commence month 1

Interim functional requirements specification: month 9

Workshop: month 13

Final functional requirements specification: month 15

WP3 Registry tools development
(Partners: ILRT lead, UKOLN)

WP3 will develop a complementary schema registry and schema creation facility that will support sharing and publishing of DC and IEEE LOM schemas and application profiles within the JISC IE. ILRT will build a Schema Registry Web Interface which will allow human users to create new schemas and Application Profiles and to browse and search existing application profiles

This functionality will be presented from a single user interface, although differences in underlying DC and IEEE LOM models will require different constraints in creating an IEEE LOM or DC application profile. The various options for software design may integrate the back-end database to a greater or lesser extent.

ILRT will develop m2m access to XML schemas associated with application profiles and to RDF schemas associated with application profiles where appropriate. The Registry machine interface will be developed to provide a Web Service API interface to the registry model for remote operation via standard mechanisms such as the Web REST architectural model and/or SOAP.

The technical work will also consider emerging Web developments in describing vocabularies with RDF and Web Ontologies such as the W3C Web Ontology Language (OWL) and how that effects enhancing the existing DC/RDF based registry. Existing software and standards will be used as far as possible and appropriate.

Timescale:

Prototype Registry and Schema creation tools: month 11

Final release of Registry and Schema creation tools: month 18

WP4 Validation of m2m usage

(Partners: ILRT lead, UKOLN, Becta)

The project will identify and collaborate with applications within the JISC IE digital library and education communities to demonstrate m2m use of registry. This activity will be carried out with support of CETIS and Becta. (Becta, CETS, identified JISC services).

Timescale:

Demonstrator of m2m use of registry: month 16

WP5 Case study

(Partners: UKOLN lead, Becta)

A case study will be developed to consider the potential of an added-value validation service. This will take Becta requirements for validation and explore them by means of scenarios and use cases.

Timescale:

Deliver case study: month 16

WP6 Policy and Guidance

(Partners: UKOLN lead, CETIS)

Policies will be drawn up regarding persistence of the registry service, collection scope and quality assurance.

Guidance materials will be created for metadata schema and application profile designers on how to build their schemas, how to create and register schemas in the Registry. The material will be in the form of guided instruction, online tutorials and a 'sand-box' implementation of the Registry environment.

WP6 will meet the requirements of *schema creators* by providing materials explaining the data model and the encoding of profiles in plain, accessible language, as well as online help related to the use of the tools offered around the Registry. WP6 will meet the requirements of *systems developers* by providing materials defining and documenting the Application Program Interface that can be used in their applications to access and download (fragments of) the schemas contained in the Registry

Timescale:

Initial policy framework: month 9

Initial guidance materials: month 12

Further guidance materials: month 16

Final policy framework: month 18

WP7 Evaluation

(Lead: UKOLN, all partners)

Project partners will identify appropriate performance indicators. Evaluation will be carried out by an external consultant. If practical, the external evaluation will be planned in conjunction with the workshop targeted at representatives from user groups. Final summative evaluation will be carried out by project partners and included in the final project report.

Timescale:

Identify key benefits and performance indicators: month 6

External evaluation report: month 13

Final evaluation: month 19