eXchanging Course-Related Information: a UK service-oriented approach

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This paper describes a UK project that aims to define a vocabulary and suitable technology bindings (e.g. XML / RDF) for describing course-related information that encompasses course marketing, course quality assurance, enrolment, reporting and personal development requirements. The project is known as XCRI (eXchanging Course-Related Information) and is funded by the JISC (Joint Information Systems Committee) under its E-Learning Framework Reference Models programme.

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1. Background & Project Aims
For readers unfamiliar with the JISC¹, it is a body funded by the UK Further Education (FE) and Higher Education (HE) Funding Councils to provide strategic guidance, advice and opportunities to use ICT to support teaching, learning, research and administration. Goals of the JISC’s work include facilitating lifelong learning, enhancing the experience of learners and supporting a national agenda of widening participation. These goals are predicated on the availability of accurate and relevant information about opportunities for learners.

The need for appropriate course information has been emphasised in a number of influential reports on the UK further and higher education sector, including the National Committee of Inquiry into Higher Education (the Dearing Report), which stressed 'the importance of clear and explicit information for students so that they can make informed choices about their studies and the levels they are aiming to achieve'. The Report recommended 'that clear descriptions of programmes should be developed so that students are able to compare different offerings and make sensible choices about the programmes they wish to take'. The Committee also suggested that such programme specifications 'could usefully replace some of the prospectus material that is presently produced'. Institutions and aggregators in the UK are now responding to the challenge of supporting ‘informed choice’. The central Universities and Colleges Admissions Service, UCAS², is working with institutions to communicate relevant information electronically to potential students in the form of course “entry profiles”.

However, with the volume of study programmes offered and the range of disparate individuals who might usefully require or impart information about offerings, institutions face significant

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¹ http://www.jisc.ac.uk

² http://www.ucas.ac.uk/
logistical, cultural and structural challenges in ensuring that programmes as they are advertised match programmes as they are approved and delivered. The goal is to provide definitive specifications that describe accurately the learning opportunities that will be offered in particular locations at particular times. Within the UK, the support and oversight of bodies like the Quality Assurance Agency and Qualifications and Curriculum Authority have encouraged universities and colleges to develop sophisticated and robust quality control procedures for scrutinising proposals for new or modified programmes and ensuring that only a catalogue of suitably validated programmes is offered. In the UK, information about the nature and scale of learner enrolment and achievement on these programmes underpins annual returns to sector funding bodies. A definitive catalogue of learning opportunities is therefore central to an FE or HE institution’s marketing, quality assurance, enrolment and reporting activities.

The XCRI project aims to lay foundations for an open, service-oriented approach to managing and utilising course information by developing a suitable vocabulary and technology bindings for describing relevant data and demonstrating how such data could be managed, retrieved and transformed for different audiences using web services.

2. Project History & Deliverables

XCRI emerged from the Enterprise Special Interest Group of CETIS (Centre for Education Technology Interoperability Standards). Members had identified that mechanisms for exchanging learner, learning object and assessment data between institutional systems had tended to dominate interest and activity, whereas despite a strong business case for an open service-oriented approach to course information, it had been somewhat neglected. Dr Mark Stubbs of the Manchester Metropolitan University offered to lead the project and assembled a team of interested parties from a range of institutions, including the UK’s centralise course admissions body: UCAS.

A project website was established within the JISC’s emerging E-Framework support site and the team agreed that a project manager’s ‘blog’ would provide a good mechanism for updates and coordination.

Rather than start from scratch, the team were keen to build on best practice and an initial Work Package was designed to review existing international initiatives and critique those most suited to UK requirements. Research revealed some interesting US initiatives, most notably web service access to course information at the University of Illinois at Urbana Champaign, and some high level course description available in the eduCourse proposals. However, the most mature national initiatives were Scandinavian: Norway’s Course Description Metadata (CDM); Sweden’s Educational Information Markup Language (EMIL) and an emerging Finnish initiative. Of these, CDM was the most mature and offered mappings to the European Credit Transfer Scheme (ECTS). It was therefore chosen for critique and XCRI partners reviewed its ability to express course information necessary for their own institutions.

References:

1. http://www.qaa.ac.uk
3. http://www.cetis.ac.uk/members/enterprise
Without exception, respondents expressed admiration for the work undertaken by the CDM team. The schema and its particular attention to ECTS ensured that a ‘home’ could be found for most information that needed to be stored, however respondents felt that the CDM work required extension and re-factoring to fit to UK need. They suggested the following:

1. Separate Course Offering from Course Specification so that Offering realizes Specification and extends it to include start date, places available, etc.
2. Allow relations between versions of Specifications & Offerings to be specified
3. Make Specification (and therefore Offering) a generic curriculum object that can be “typed” to become a Programme, Course, Route, Stage, Unit, Module...
4. Provide a flexible mechanism for representing relationships between curriculum objects
5. Provide a flexible mechanism for identifiers and typing statements that works with locally and nationally-administered coding schemes
6. Provide a flexible mechanism for representing multiple accreditations
7. Provide a flexible mechanism for representing fractional relations between the curriculum object and other entities, such as locations, teaching bodies and cost

The team concluded that it should seek to develop a schema that would go further than CDM, but must be capable of mapping to it and ECTS. Work Packages involving a series of site visits, workshops and online discussions were initiated with a view to defining a set of attributes that would enable all required information to be expressed. Attributes were presented as candidate elements for an XML schema on the project blog and refined through community feedback. Once the set of elements had become reasonably stable, a major Work Package was initiated to validate the set against information expressed in UK online prospectus entries. 161 prospectus websites were reviewed and the list of candidate elements refined on the basis of this major exercise to assess coverage and category discrimination.

Based on this work, a draft XML schema was released for consultation. The schema was released with sample XML instances for institutions that had been involved in earlier piloting work, which provided concrete realisation of the schema and prompted excellent feedback from XCRI partners and other respondents.

Feedback from the consultation draft was incorporated into a revised Release 1.0 schema that was published on 22/12/2005.

January 2006 saw pilot deployment in six key areas:

1. A leading consultant demonstrated that the v1.0 XCRI XML could be used successfully as an interim data transfer format for uploading one UK university’s course catalogue to the central UCAS database.
2. An early draft was deployed in a reliable messaging environment to test its ability to aggregate adult learner opportunities across

http://www.elframework.org/projects/xcri/20050520Manchester

http://www.elframework.org/projects/xcri/xcri_research_v0c.doc
http://www.elframework.org/projects/xcri/xsd_consult
http://www.elframework.org/projects/xcri/20051222Manchester
a number of education providers in the North West and East of England.

3. A single developer in a Scottish Further Education College demonstrated that a v1.0 XCRI XML adapter could be developed for their existing prospectus database in only an afternoon.

4. A JISC-funded Regional Pilot project developed Microsoft Word templates and web forms for entering Further Education-oriented v1.0 XCRI XML.

5. Oxford University used v1.0 XCRI XML as an internal data transfer standard between their courses database and the careers service.

6. A prototype XML repository was developed to upload, validate, search and extract v1.0 XCRI XML documents.

The last of these areas represents a particularly novel deployment that might be of wider interest to readers.

A suite of Java Servlets has been developed by Paul Walk of London Metropolitan University\(^\text{14}\) that provide access to an XML database – SleepyCat’s Berkeley DB\(^\text{15}\). A webdav\(^\text{16}\) interface allows XCRI XML documents to be uploaded to an area from which they can be imported into the database. Documents are validated on upload against the XCRI schema. Servlets provide XQuery and REST access to XCRI document fragments (XCRI:any) from the repository.

The REST interface offers a novel XPath URL that returns requested content\(^\text{17}\)

This URL would return any curriculum specification node tree with an identifier of 5A2070.

The Servlet follows REST protocol in returning an HTTP/1.1-compliant header:

200 if the search returns matching XML
404 if the search returns no matching XML. The genesis of this approach is described in an XCRI blog entry\(^\text{18}\)

The XCRI team have been impressed by the possibilities for light-weight systems integration afforded by this approach, for instance in presenting to interested consumer systems just the learning outcomes of a particular study module, or the entry requirements for a particular course. This has the potential to enable rapid interconnection of definitive curriculum repository content with e-Portfolio and personal development planning systems.

3. Plans for Further Work

Lessons learned from these pilot deployments will be incorporated into Release 1.1 of the schema, which will decompose the XSD into a series of more manageable, name-spaced components.

A key focus for schema development will be ensuring that course entry requirements are modelled in the same ‘currency’ as recognitions of achievement – qualifications, certificates and licenses, etc. It is hoped that entry requirements expressed in such a form could be used within a service-oriented environment to discover pathways currently open to a learner, prompt them on how to structure their application, and identify any pre-requisite studies necessary to enter a particular course. XCRI will be working closely with UK e-Portfolio and e-Admission projects to pursue this ambition.

\(^{14}\)http://www.londonmet.ac.uk/

\(^{15}\)http://www.sleepycat.com

\(^{16}\)http://www.webdav.org/

\(^{17}\)http://server:8080/xcri/curriculum/spec[identifier ="5A2070"]

\(^{18}\)http://www.elframework.org/projects/xcri/2005111Manchester
Further work will focus on tools for authoring XCRI-compliant XML and supporting institutional templates for courses, modules and other study components. In the UK, most content of this nature is currently contained within monolithic Word documents, from which data subsets, such as benchmarks, learning outcomes, and assessment regimes, cannot be extracted easily.

Central to the ongoing development of this initiative will be buy-in from vendors and negotiations towards that end become a particular priority for further work. The structure of the UK market is such that UCAS, as central aggregator, has a major influence on student records system vendors as they must integrate with UCAS systems to download applicant data. UCAS and JISC have recently announced a partnership that will take forward the e-Admissions agenda, and it is hoped that a service-oriented approach to course information handling will form an integral part of this initiative.

4. Summary
This paper has outlined the JISC-funded XCRI project that has been pursuing a service-oriented approach to exchanging course information, which addresses course marketing, quality assurance, enrolment, reporting and personal development requirements. It has summarised the evolution of a candidate XML schema for expressing curriculum content and provided links to web content describing in more depth the schema and rationale for its construction. Deployments of the schema within real systems have been highlighted from the North, South, East and West corners of the UK, and a novel REST approach to querying an XML repository of curriculum content has been illustrated. The paper concluded with an overview of directions for future development including schema namespace decomposition; liaison with e-Portfolio and e-Admission initiatives regarding entry requirements and a common ‘currency’ for recognition of achievement; content authoring; and plans for securing vendor support.

Full details of the project: http://www.elframework.org/projects/xcri
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