

## Course description metadata (CDM) : A relevant and challenging standard for Universities

### The context :

Universities, as “knowledge factories” have always been major players in the R&D on information and communication technologies (ICT) and on information management. However their R&D capacities have often failed to encompass their own information systems. Recently the European Commission through the “Education & Training 2010 work programme”<sup>1</sup> and through several initiatives (such as eGovernment) has strongly encouraged European universities to apply ICT to provide better services to their users. A 2006 European commission reports states that a sustained public effort is being made throughout the Union: In several European countries the move of University toward a “e-administration” and the development of a comprehensive set of added value services to users has been strongly encouraged by their governments. The academic communities have been encouraged to make intensive use of ICT, in large part because of the development possibilities that ICT brings to the field of education but also because of the new online services which are now requested the University “customers”. Things are moving quickly in some countries with the impulse and funding of such initiative, such as the “Université Numérique en Région” UNR project launched in 2003 by the French ministry of Education. In UK JISC and CETIS have initiated many challenging projects in this direction.

At a global level the European responses to the context and challenges of international competition are geared toward higher education: building a Europe of knowledge and constructing the European research area.<sup>2</sup> In this prospective, strengthening the collaboration between universities is a major objective. The “globalisation process” already affects the higher education sector. European universities increasingly have to come to terms with competition between higher education institutes at the European and international level. The stakes involved in this competition are high for the future of Europe: beyond the issue of the international notoriety of European Universities or their capacity to attract talented students and researchers, the economy of Europe is at stake with the development of research and innovation. Therefore higher education institutions in Europe have a common objective of increasing at the same time the quality, the attractiveness of their education systems and the efficiency of their management .

The Bologna process<sup>3</sup>, confirmed by the recent BERGEN declaration, has outlined major issues to be addressed by universities: a common framework for Higher Education diplomas and competencies, the mutual recognition of these diplomas and the development of “physical” and “virtual” student mobility. The Bologna process has set the way by structuring University curricula around a common framework (3/5/8), already improving their international “visibility” . However more work has to be done, specifically in terms of harmonisation and standardisation to reach the Bergen’s objectives. The Bergen Conference of European Ministers Responsible for Higher Education has adopted (May 19-21 2005) the overarching framework for qualifications in European Higher Education (EHEA), comprising three cycles, generic descriptors for each cycle based on learning outcomes and competencies. Ministers committed themselves to elaborating national frameworks for qualifications compatible with the overarching framework for qualifications in the EHEA by 2010, and to having started work on this by 2007. Their work program includes the following actions:

- Examine the outcomes of the implementation of the Bologna Process today & the benefits to Europe Higher Education Institutions (HEIs) of their involvement in the Bologna Process
- Examine the standardisation issues in relation with ECTS / diploma supplement
- Explore how HEIs can increase their engagement and capitalise on the opportunities to share information on their curricula
- Exploit the opportunities that the proposed standards will offer to Europe HEIs
- Outline the implications to structuring Europe higher education area (EHEA)

<sup>1</sup> The Education and Training 2010 work programme was agreed by the European Council in 2002 as a major contribution towards the Lisbon strategy.

<sup>2</sup> [http://www.europa.eu.int/comm/education/policies/2010/et\\_2010\\_fr.html](http://www.europa.eu.int/comm/education/policies/2010/et_2010_fr.html) et [http://www.europa.eu.int/comm/education/policies/2010/objectives\\_en.html](http://www.europa.eu.int/comm/education/policies/2010/objectives_en.html)

<sup>3</sup> [http://europa.eu.int/comm/education/policies/educ/bologna/bologna\\_fr.html](http://europa.eu.int/comm/education/policies/educ/bologna/bologna_fr.html)

This has provided strong incentives to European Universities to describe the organisation of their curricula in a harmonized way. A part from technology issues which can be solved to day, the blocking factor to the development of interoperable University portals at national, regional or European level can be found in the various data models, data format and terminology used by European Universities to describe their curricula, course catalogue, their enrolment criteria & registration procedure. This leads to inconsistent information for users, making any comparison very difficult. University portals are not yet interoperable although the enabling technology is available as well as “specifications” for interoperability at the system level and at the application level. However data interoperability is very limited by lack of widely recognised standard (or at least of specification). These limitations can be overcome by the development, deployment and adoption of CDM Specification.

### **Course description Meta data CDM**

The CDM specification <sup>1</sup> was developed in 2001 by USIT's XML group at the University of Oslo for the Norwegian eStandard project, Norway Opening Universities (OUN)<sup>2</sup>, a national initiative for change and innovation in Norwegian higher education, in the field of lifelong and flexible ICT-supported learning in higher education. OUN has developed and deployed locally a set of metadata and an XML schema “CDM”<sup>3</sup> which has been adopted by all Norwegian Universities and is actually at the root of Norway's national educational portal <sup>4</sup>. CDM was first known as eSU (“elektronisk Standard for Utdanningsinformasjon”).

CDM (set of metadata and XML schema) has been presented in 2005 to the CEN/ISS as a “candidate standard” for course description. Besides the fact that this new specification fully supports the ECTS, and the diploma supplement (EDS), it integrates (& is compatible with) a number of existing standard specifications, such as IEEE Learning Object Metadata (LOM) – to describe the course content . However, there is a significant gap between the release of a new specification and the full realisation of its potential benefits by the potential users . As these specifications will strongly impact their information services, European Universities must make sure of their compatibility with their own information system. Thus the very strong points of the « CDM » format are that it supports the actual diversity of higher education in Europe & the wide range of curriculum organisation models.

- It supports ECTS & EDS requirements
- It supports interoperability at system and data level.
- it supports of local or national application profiles;
- It can be used to describe all level of granularity of the University educational offer ( curriculum, diploma, course , course unit..) as well as related pedagogical objectives, registration procedure, organisation and contact details...
- CDM supports multiple organisational models, and as wide a range as possible of both present and future, course & curricula models , it takes on board national specificities through specific “implementation profiles”.
- It is fully compatible with other related specifications such as LOM for course content description.
- CDM is technologically “neutral” ,(it does not requires a specific data base management system or a specific information system).

### **State of the art**

In recent years a number of specifications and standards relating to learning & specifically to “eLearning” have been established, providing the foundations for the implementation of tools and systems, and the enabling framework for interoperability at the course content level. These specifications include among others, learning object metadata (LOM), students profiles (LIPS) and portfolios. However, before CDM, no specification had been produced by standardisation bodies to supports curriculum development and access to curriculum structures and properties. There

---

<sup>1</sup> The CDM specification proposes a set of common metadata and common format (data structure) to describe and publish HEIs curricula, course catalogues and all relevant information for students

<sup>2</sup> <http://norgesuniversitetet.no/seksjoner/english> & <http://Utdanning.no>

<sup>3</sup> <http://universitet.no/estandarder2001>

<sup>4</sup> <http://www.studyinnorway.no/>

was no standard available to describe higher education organisation, diploma supplement, degrees, courses, ECTS/EDS . Therefore CDM has been recently introduced by the Norwegian partners at the CEN/ISSS<sup>1</sup> . OUN actively liaise with other standardisation bodies working in the same area.

This project is actually gaining some momentum in Europe . An initiative led by the French Ministry of Education has developed a French application profile which has been locally tested in a few Universities and is being progressively deployed by French Universities<sup>2</sup> and other Higher Education Institutions. In UK through the eFramework initiative, The XCRI<sup>3</sup> project, assessing the suitability for UK need of the [Norwegian CDM XML schema](#) is working on an application profile which takes on board DUBLIN CORE. One of the aims of the project is to collect views on the CDM work and suggestions for a closer fit to UK need. XCRI partners work closely with the CDM and EMIL teams to advance understanding of curriculum metadata requirements and possibilities<sup>4</sup>. What is needed now is a wider take up by European Universities, working on national / local application profiles, to test and enrich the proposed specification. Several “field tests” in different countries are necessary to validate and to accelerate the implementation and adoption of CDM, while creating Europe wide awareness on these issues.

### **The “standard”<sup>5</sup>**

The initial CDM project core objective was to provide access online to up to date, complete and federated information on the various curricula degrees & elearning programs delivered by Norwegian Universities. Actually numerous documents from international projects and standardisation efforts in the educational domain are relevant for the CDM specification. CDM is compliant with relevant IMS standards or CEN /ISS specifications such as :

- IMS Reusable Definition of Competency or Educational Objective - Information Model. Version 1.0 Final Specification.
- IMS Resource List Interoperability - Information Model. Version 1.0 Final Specification.
- IMS Meta-data Best Practice Guide for IEEE 1484.12.1-2002 Standard for Learning Object Metadata. Version 1.3 Public Draft.
- IMS Enterprise Information Model. Version 1.1 Final Specification.
- IMS Vocabulary Definition Exchange Information Model. Version 1.0 Final Specification.
- CWA 14926: Guidelines for the production of learner information standards and specifications. March 2004.
- CWA 14927: Recommendations on a Model for expressing learner competencies. March 2004.
- CWA 14929: Internationalisation of SIF and harmonisation with other specs/standards. March 2004.

Further work on the CDM specification will specify the guiding principles for harmonization and harmonize the CDM specification according to the relevant standards and specifications

CDM addresses the description of educational course units or other forms of educational offerings at all levels. It specifies the structure and semantics of the key concepts used in course descriptions. The metadata are specified as an XML Schema, and guidelines with examples are given to facilitate the generation of course descriptions as XML documents. When describing educational course units there is a need to be able to also describe entities related to the courses. Therefore CDM not only lists and describes the study programmes and their course units and

---

<sup>1</sup> <http://www.cenorm.be/iss/>

<sup>2</sup> <http://formations.univ-lille1.fr/cdm/>

<sup>3</sup> [http://www.elframework.org/projects/xcri/Project\\_Plan\\_v0b.doc/download](http://www.elframework.org/projects/xcri/Project_Plan_v0b.doc/download)

<sup>4</sup> [http://www.elframework.org/learning\\_domain\\_services/curriculum](http://www.elframework.org/learning_domain_services/curriculum)

<sup>5</sup> CDM - Course Description Metadata: <http://cdm.nou.no/>

Norway Opening Universities (NOU): <http://norgesuniversitetet.no/>

ECTS - European Credit Transfer System:

[http://europa.eu.int/comm/education/programmes/socrates/ects\\_en.html](http://europa.eu.int/comm/education/programmes/socrates/ects_en.html)

course content, it also supplies all the information needed by students needs to choose to study at a certain institution, in a specific programme, or to take certain courses. CDM metadata are divided into four parts:

Part One: Information on the Institution

Part Two: Information on degrees, study programmes, course content

Part Three: General information for students (student facilities, cost of living, registration, tuitions, calendars, regulations, practical information for mobile students..)

Part four: information on all the relevant contacts

Localisation : CDM metadata can be translated in all European Languages, thus enabling Higher Education Institution to publish on the web their curricula in the local language and in English according to the ECTS /EDS requirements.

The metadata are intended to satisfy the following objectives:

- Facilitate description and exchange of information about educational course units
- Facilitate standardization of course unit descriptions
- Facilitate the establishment of national and international course catalogues
- Facilitate the establishment of interoperable on line course catalogues on University portals and other services.

The common specifications to describe Universities studies through out Europe must be declined locally/nationally in CDM compliant application profiles. Local or national CDM application profiles need be developed to describe all components of a given curriculum, in all subject areas while preserving the over all coherency of the different study organisation and their coherency with local or national requirements. It would then be possible to set up interoperable portals which would enable national and international students, individuals and organisations, to easily to an extensive list of academic courses related to a specific field or subject, and to select among the different courses offered by the European Universities.

### **A European challenge, a complex issue**

At an European level the implementation of CDM , through national or local application profiles would enable European Universities to describe and publish their curricula and course portfolios in a common format (including meta data and XML schema ), thus making possible a multiple search for users through the connection of interoperable University portals .

This would enable each University to better meet the information needs of its own target students and to reach out to a much larger potential student population, beyond national boundaries while making possible information exchange for programme mutualisation. It would enable students, students' advisors, and employers, to identify, compare and choose relevant study programs, curricula, e-learning course available within & beyond their local or national Universities

Of course introduction of CDM into the university Information system is a trouble raising process. In most European Countries, CDM "adopters" need to overcome both the limitations of the current University online information systems and the reluctance to changes of all the staff involved into registration and curricula production. This process may require introducing new workflows into the University information production flow as well as new ways of describing curricula. This may imply organisation changes. Further more Interoperability of an educational system requires a model of the system in question, this is not a simple issue both at national level and within a complex organisation such as a University. Therefore the introduction of such a "standard" into HEIs is not so much a technical issue than a "political" issue which need be fully supported locally by the organisation and if possible at a higher "political level" by regional and/or national authorities.

### **An example: the French application profile of CDM (CDM-fr)<sup>1</sup>**

How to overcome these reluctances and turn this "vision" into a national and local reality?

This is the challenge that the universities member of the French national work group on CDM<sup>2</sup> have been willing to take up in 2005-2006 and to apply at regional level within their own university consortium (UNR). They have mutualised not only the "technical approach" but they have also worked to find appropriate and sustainable answers to a series of complex questions:

---

<sup>1</sup> <http://www.educnet.education.fr/articles/cdm-fr.htm>  
<http://www2.educnet.education.fr/sections/superieur/soutien/normes/>

<sup>2</sup> <http://acces.inrp.fr/cdm/>

- How to define the common application profile with examples, guidelines and description rules that each partner can use within its context to structure & index its data?
- How to extract relevant data from legacy systems , how to convert these data into a CDM format, how to enrich this data
- How to adjust the existing models for course and programme description yet available in partners Universities,
- How to deal with the volume of data , the number of course and programme description that need be digitized and standardised through the mutualisation system,
- How to describe the current procedures and processes for producing these data and the required change in the information workflow .
- How to fit the project within the overall development strategy and priority of the university, and ICT resources and means available,
- What are the technical constraints that have to be taken into account in the design of the architecture of the project,
- What are the needs and demands of the different actors for taking on board their current practices and uses
- How to manage change within the organisation , introducing new production workflows
- How to enlarge the partnership to other regional higher education institution
- What would be the best technical architecture of the content management system so as to guarantee a real flexibility of the overall system, allowing its easy development and adaptation to new organisational needs?

This has involved intensive networking and mutualisation efforts both at local, regional and national levels. It has also required gaining strong support from different stakeholder and key actors, with different roles, from political to technical in the Universities. To reach the objectives, the French working group has set up pilot groups in several Universities (e.g. Universities of Lille, Rennes, Montpellier, Strasbourg) in charge of testing and validating the proposed “French CDM” (CDM-fr) compliant to CDM. To foster the adoption process communities of practice are being created at local and regional level to better inform and involve the different actors concerned by the project and to include new comers. The work methodology elaborated for the “Languedoc Roussillon Universities” UNR-LR project in 2005-2006 results both from the main issues identified above and from this open approach. It has to take into account local context and to impulse changes within the 4 academic communities in order to the project challenges, in due time.