Report of the CUBER Workshop

EUROPEAN CREDIT TRANSFER SYSTEM AS BASIS FOR GENERALISED COURSE RECOGNITION

held on January, 29th 2001

at the Centre for Distance and Open Learning

University Karlsruhe, Germany

Deliverable D8.6

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0   Preface

The 1st CUBER workshop upon ECTS took place at the Centre for Distance and Open Learning (FSZ) University Karlsruhe (TH) on Monday, 29/01/2001, 10 am to 5:30 pm

The goals of the workshop were to

- Work out a general approach of mutual recognition of courses, based on the ECTS scheme (One of the goals of the EU-IST project CUBER (www.cuber.net) is to support the mutual recognition of courses among European universities.)

- Propose methods and mechanisms that go beyond the present day credit transfer systems that are based on individual agreements for each individual student.

- Improve the knowledge and promote a deeper understanding about credit point systems (CPS), in particular the European Credit Transfer System (ECTS) within the CUBER consortium.

- Promote especially the issues and problems relating to the CUBER project.

- Enable use and exploitation of this knowledge within and outside the CUBER consortium.

The Programme

Morning session:

- Introduction into Credit Point Systems / CPS and the European Credit Transfer System / ECTS (Joerg Keller / FernUniversitaet Hagen, Germany)

- Course recognition in Austria (Josef Reif / University of Linz, Austria)

- Course recognition in Finland (Heli Kautonen / University of Helsinki)

- Course recognition in Spain (Martinez Aceituno / Universitat Oberta de Catalunya, Barcelona, Spain)

- Discussion (Joerg Keller / FernUniversität Hagen, Germany)

Afternoon session:

- Usability of metadata schemes for EuroStudyCentres (Frits Hoff / EADTU)

- Use of CPS in the Netherlands (Astrid Scholten / NUFFIC, Netherlands)

- The CANDLE Project (Jodok Batlogg, Christian Mayerl / University Karlsruhe)

- EUROPACE and ECTS (Statement from Jef Van den Branden / EUROPACE (communicated by Joerg Keller / FernUniversitaet Hagen, Germany))

- UNIVERSAL and Accreditation (Statement from Bernd Simon / Vienna University of Economics and Business Administration, Austria (communicated by Gottfried S. Csanyi / University of Linz, Austria))

- Discussion and Conclusion (Gottfried S. Csanyi / University of Linz, Austria)

1 Morning session

The morning session was dedicated to an introduction into Credit Point Systems (CPS), especially the European Credit Transfer System (ECTS), and to reports about the state of the art and recent developments in the use of ECTS in several of the member countries of the CUBER consortium.

1.1 Introduction to CTS

Credit point systems (CPS) are used in two settings

- as accumulation systems within a certain study programme, or

- as transfer systems to recognise performance from a previous programme in a later programme.

The credit point systems of American universities typically are examples of the first kind of CPS. In the American system of tertiary education students switch between programmes or institutions (mostly colleges or universities) only at certain points, i.e. after obtaining a bachelor or a masters degree. The receiving institution (i.e. the institution the student moves to) recognises the degree itself, and bases its admission decision on an entry examination. A transfer system is not needed in the American system.

The European Credit Transfer System (ECTS) is of the second type. It originally served to increase student mobility by encouraging students to spend some time, typically a semester or a study year, at another institution abroad. ECTS did so by increasing trust between institutions via a standardised information channel, and by increasing trust between students and institutions. The latter is achieved via enforcement of a decision about recognition by the home institution of courses successfully completed at the host institution.

A recent study has been undertaken about the extension of the ECTS system into an accumulation and transfer CPS, the European Credit System ECS. This study is of importance as it addresses issues related to the use of ECTS within the CUBER project. (ECTS Extension Feasibility Project, Report Jan. 2000, http://europa.eu.int/ comm/ education/socrates/ectsext.html)

The ECTS has three main parts

a) An institution participating in ECTS assigns each course a number of credit points to be awarded for successful completion of this course. The average successful student shall obtain 60 credit points per year. The number of credit points for a certain course shall reflect its share in the workload of the student for this year. E.g. if a course comprises 10% of the workload of a student in the study year the course is placed in the programme to which the student is enrolled, then it shall be assigned 6 credit points.

By workload, the total amount of a student is meant, i.e. time spent in class, time spent in laboratory, time spent in library, at home doing exercises, and so on.

Award of credit points is a 0-1-decision: if the student completes a course successfully, he or she will be awarded all credit points assigned to this courses, no matter how the performance was. Therefore, the ECTS also has a grade system, that mainly serves as a conversion measure between local grading systems.

b) An institution participating in ECTS has to provide an up-to-date information package describing all its programmes, all courses, its organisational structure, the person or office to contact on issues related to enrolment ECTS. This information package serves as information source for prospective guest students and their home institutions.

c) A student wishing to spend some time at a host institution will use the information package to decide which courses to attend. Before she or he moves to the "host university" a contract between the student, his home institution and the host institution is set up that states that the student can attend the courses chosen, and how successful completion of these courses will be recognised at the students home institution.

The ECTS is a compromise to facilitate the exchange of students. One of its disadvantages is the implicit underlying assumption that student workload is identical in each study year. However, student workload can vary substantially between different study years or study programmes. Thus, if a course is offered in several programmes, the number of credits assigned to it might be different in each programme! The ECTS manual suggests to assign one value in the long run by finding a compromise via harmonisation.

This disadvantage reflects a general problem with measuring student workload: one could use the number of student hours as a basis. However, the total number of hours a student spends on studies per study year varies between 1600 and 1800 hours in different countries, institutions, and programmes, a difference of more than 10%! A further question is if students that need less time to complete a course for example because the instructor does a better job in preparing classes, should students get fewer credits?

As many institutions do not regard the contents of an information package sufficient to base a decision on, the ECTS has lead to a large number of bilateral agreements between institutions with frequent student exchanges. But ECTS has not lead to a free exchange of large extent, because many students will avoid the effort involved with obtaining admission and sufficient recognition on their own, i.e. without institutional support of their home institution.

1.2 Reports

1.2.1 Germany

In Germany, the use of ECTS in computer science programmes is not very widespread. The use of CPS in general is not very wide spread, either. This is partly due to the fact that German study programmes, at least in the first two years, allow the students few if any choices, hence there is no need for an accumulation system. The main argument against accumulation systems is that they might lead to students studying a-la-carte, i.e. accumulating courses without a coherent structure. The main argument against transfer systems is that the credit points are no advantage against any other measure of student workload, such as hours per semester week (which can be transformed into hours as the number of weeks in a semester is normally known.)

The Bologna declaration has not yet been turned into national law such that introduction of a CPS is mandatory, as is the case in Austria (see next section).

The German university study system distinguishes between certificates for single courses and exams covering several courses. Modularization, which is a necessary prerequisite for the assignment of credit points, is difficult the more exams exist that cover more than one course.

The University of Hagen does not yet use the ECTS. Despite of that, new programmes such as the Bachelor of Science in Computer Science are prepared for ECTS by modularization and assignment of credit points to courses.

1.2.2 Austria

In Austria, a law was passed in 1997 that introduction of the ECTS is to be completed until 2002. Also, there has been an integration (meaning use and accreditation) of distance education modules in traditional university studies.

The University of Linz currently is in the phase of implementing the ECTS for all of its programmes, even the study of law. There has been a joint programme in business administration with FernUniversitaet Hagen from 1994, with ECTS used for that from 1998 on, although Hagen normally does not use ECTS at all.

1.2.3 Finland

The Finnish situation is different from the previous ones in the sense that there is an established national Finnish credit point system which is used both for accumulation and transfer, and that transcripts of records are already in use.

This credit point system assumes a student to acquire 40 credit units (cu's) per study year. A natural conversion rule towards ECTS is 1 cu equals 1.5 ECTS points. However, there is one Finnish university (U. of Helsinki) that uses a conversion of 2 ECTS points per cu, because of the assumed student performance. Also, in continuing education, no credit point system is used.

The Finnish university system also distinguishes between certificates (for single courses) and exams (covering several courses). Yet, exams recently have been partly replaced.

1.2.4 Spain

The Spanish university system uses accumulation systems since 1987, one credit is equal to 10 hours of work. There are no broad examinations, only course based exams. Hence, the assignments of credit points to courses is no problem. The recognition of courses is simplified by the fact that the mandatory courses in (computer science) programmes are almost standardised nation-wide.

Consequently, the UOC programmes are ECTS compliant although the ECTS is not yet implemented at UOC. The UOC's project metacampus aims at automatic recognition of course work.

A particularity of the Spanish system is the recognition of degrees, which is under the control of the ministry of education. They can be accepted, accepted with an additional exam, accepted with additional studies, or rejected.

1.2.5 The Netherlands

As a look-ahead to Section 2.1.2, we briefly sketch the use of ECTS in the Netherlands. The Netherlands have a national credit point system of 42 credits per year. Each credit is equivalent to 40 hours work, i.e. one week. The number of working weeks during a study year (42) thus defines the number of credits per study year.

A switch to the ECTS is planned, however it is not clear whether the conversion factor will be 1.5 or 60/42=1.43.

1.3 Discussion

It was identified that ECTS needs to be extended at least in the following directions to be used within the CUBER project: next to the extent (=workload), the difficulty level is needed. While the OU UK has categorised its courses into level-1, level-2, ... courses, there is no similar move in continental Europe. Also the type of decision whether the student passed a course should be given; was it an oral exam, a written test (midterm and/or final as in the USA), was it based on performance in assignments, or was it simply a check whether the student attended class. Also the description of the content should be given in a standardised way in order to decide whether one course could replace another. These findings are in accordance with the study to extend ECTS to ECS. (ECTS Extension Feasibility Project, Report Jan. 2000, http://europa.eu.int/ comm/education/socrates/ectsext.html)

In order to accomplish this task, the CUBER system can either be a tool that (semi-) automatically detects whether one course could be accredited in another programme in the sense that it replaces a course of that programme, or the members of the CUBER

consortium could agree on a set of CUBER certified courses that are accepted by all consortium members.

The latter possibility is clearly semi-automatic. Yet, the manual part is done off-line and in advance, and hence task of the CUBER system while processing a specific query is (hopefully) simplified so that it can be accomplished automatically by the system without human intervention. In this respect, this possibility is clearly superior to the first one. If the first possibility is semi-automatic, it might require human intervention for the processing of a specific query, which might disable the interactive processing of certain types of queries. The latter possibility also has the advantage that it relieves from comparing too many numerical values of parameters to make a decision.

Parameters like difficulty tend to be owner-based, i.e. "My course is more difficult than others, so I assign a higher value". If agreement on recognition is done in advance, these numerical problems will not occur. On the downside, the latter possibility might lead to a vast amount of manual work to maintain the catalogue of certified courses because of frequent fluctuation of courses. It is unclear how much work in advance will pay off against the first possibility, because it is unknown for some part of the courses whether students might want to exchange them at all.

The first solution necessitates to have an extensive metadata model of the courses and a rule-based algorithm to decide about acceptance. The latter solution requires a set of minimum standards and the effort of consortium members to certify courses manually. Additionally, it was questioned whether there was an objective labelling of the course difficulty, as each institution tends to categorise its own courses as more difficult than others courses. A problem with the first solution is the amount of work required at each participating site to keep the metadata model up-to-date.

Concluding, the ECTS was conceived as an important step and a good starting point, but, in accordance with the study to extend ECTS, further course descriptors are needed to facilitate accreditation of courses completed successfully at another institution.

It was noted that the situation gets much more complicated if, instead of a single course, a set of courses already successfully completed is to replace an so far unknown but maximally large set of courses of a new programme. Unfortunately, this is the typical situation if students already have a first degree and want to obtain another with the least workload possible.

2 Afternoon session

2.1 Reports

2.1.1 EuroStudyCentres / EADTU (www.eadtu.nl)

The EADTU is a promoting and supporting the creation of a European network for higher level distance education. It is comprised of 18 national members from 14 countries collectively providing distance education programmes to over 900,000 students through 875 study centres of which 55 are EuroStudyCentres. It is part of the mission of EADTU to work together on course and credit transfer and to promote access to higher open education in Europe.

Thus ECTS is a necessary tool for the daily business of ESCs, and it's extension a major goal of the EADTU. The EADTU was part of a feasibility study of EC in 1999 (Report for the European Commission: ECTS Extension Feasibility Project (January 2000); http://europa.eu.int/comm/education/socrates/ectsrap.pdf). Some lines of this study may be quoted here:

> "Credits only reflect the quantity of achievement in the context of an educational programme. They do not express any evaluation of the content and the academic level or the quality of a programme. That is because the ECTS has mainly been used in the context of bilateral student exchange in the framework of ERASMUS/SOCRATES. These bilateral agreements, often within small networks, are based on mutual understanding and trust, which over the years is confirmed by practice. EADTU members emphasise this formal quantitative character of credits, but they also stress the need for a qualitative description (academic content and level, competencies, taught outcomes etc.).

> Furthermore, they point out that not all educational institutions even use the ECTS system, i.e. private institutions. In applying ECTS, problems occur. In practice some institutions have not always modularised their educational programme (i.e. in Germany) or the programmes have sometimes not been described in terms of workload, but only in terms of content/performance (i.e. in Denmark). The ECTS grading system (A-F) is often felt to be a difficulty, as it doesn't differentiate achievements in the top segment of the scale in such a way as it does in the middle.

> *2. Advantages of creating a European Credit Accumulation Framework*

> As ECTS is a credit transfer system, EADTU members refer to mobility as one of the major advantages of the system. Of course ECTS promotes the exchange of conventional students, but it should also be a tool for the virtual exchange of students ("virtual mobility") i.e. either before a semester abroad, or instead of, or as a complement for a course at the home university. This can be done between open and distance universities, or between these universities and traditional universities. This can particularly be useful in a lifelong learning context, but also in international programmes, i.e. Master programmes.

> Furthermore, EADTU members emphasise the use of ECTS as a tool for the exchange of courses, as according to the system a full description of courses with all academic information is given. In doing so, institutions can widen the choice of students and

promote a European dimension in their course profile. Above all, institutions can enhance the quality of their distance education offer by using courses within networks of institutions. Furthermore, they can reduce costs by adopting existing materials or by co-operating on a complementary basis with partner institutions.

Also, a virtual ERASMUS scheme is possible. In such a scenario, specific arrangements are needed for examinations."

(APPENDIX 4.16: Reports from States, Regions and Organisations. http://europa.eu.int/ comm/education/socrates/ann4ects.pdf)

The EADTU will be part of the planned European Portal where CUBER should act as the broker system. Therefore the ESCs offers a very interesting test network for the CUBER database and would like to give input on metadata definition at the earliest possible time.

2.1.2 Use of CPS by NUFFIC / Netherlands (www.nuffic.nl)

NUFFIC is the Netherlands Organisation for International Co-operation in Higher Education. It's main areas of activity are development co-operation, internationalisation, the fostering of transparency and mutual recognition for education on emerging markets. Its core business is programme management, the management of networks, consultancy, credential evaluation, and communication. Furthermore it deals with evaluation of foreign qualifications, fosters recognition of Dutch degrees, and provides information on Dutch higher education.

Main instruments of course recognition are the international legislation, the Lisbon Convention (Council of Europe / UNESCO, April1997), and the Bologna Declaration (June 1999). For the description of the qualification the following categories are used:

- Name of degree

- Abbreviation

- Type of degree

- Admission prerequisites

- Disciplines

- Duration of course

- Structure of course•   Final examination

- Documents and certificates issued

- Degree granting institution

- Intermediate examination

- Grading system

A qualitative extension of the ECTS is desirable for making student exchange and studying abroad less complicated.

2.1.3 The CANDLE Project (www.candle.eu.org)

Collaborative And Network Distributed Learning Environment, a project within the "European Network of universities and companies in Information and Communication Engineering" (www.eunice-forum.org)

The presentation was very interesting for metadata questions and concertation but less focussed on the ECTS-topic. For details see annex 1.

2.1.4 EUROPACE and ECTS (www.europace.be)

EuroPACE is a trans-European network of universities and their partners in education and training, i.e. private enterprises, regional and professional organisations and public authorities. Approximately 60 member organisations (45 of them universities) participate in this network throughout Europe.

Through the use of different models EuroPACE demonstrates and develops the potential of telematics for the European university of the future and thus contributes materially towards the realisation of the concept of lifelong learning.

From the EuroPACE point of view ECTS is fine for the description of course contents, and is as such accepted by universities in the framework of the ERASMUS exchange programme (and increasingly also outside this programme, e.g. as information for decisions on acceptance to a programme or decisions on the content of a personalised curriculum).

The Advantages of ECTS

- A (more or less) standardised and (relatively) extensive content description of a course or student activity is enabled, especially when the appropriate forms that are provided by the EU are being used;

- A quantitative expression (credits), based on the estimated study or work load of students is enabled and the arbitrary estimate of the weight of such activity in the programme that is followed by the student;

- The enabling of comparisons between similar courses/activities in various curricula within the same university or in various universities/countries.

With respect to CUBER, it can be concluded that ECTS can be useful, as demonstrated in ERASMUS, under the condition that the essential elements of the standardised description of ECTS are covered by the metadata that are maintained in the CUBER framework.

Insufficiencies of ECTS

ECTS is however insufficient to provide a qualitative statement on the course/student activity. Within ERASMUS, qualitative statements are the result of bilateral negotiations between universities that enable the "translation" of credits as awarded by the "guest" university into credits or marks/scores which the "home" university will take into account when evaluating the student. In other words, accreditation of the course/activity by the home university is not, and can not be an automatic procedure, while it depends on to many factors: e.g.

- Is the appreciation of a course/student activity the same in both universities; in how far are the course/activity content and the attention paid to various topics at the guest university comparable to a similar course/activity in the home university;

- How comparable are the weights in the overall student evaluation of the course/activity in the guest and home universities (e.g. as result of the fact that this course/activity in the guest university is attached to a – eventually slightly – different degree programme than its counterpart in the home university);

- Are evaluation criteria in both universities identical or not;

- Is evaluation in one university as severe as in the other;

Conclusion

Using metadata is a good way to ensure a standardised description of the course or student activity that may enable accreditation, but for doing so additional interpretation and comparison is needed. (For example, in ERASMUS, the negotiations are conducted between the providing and receiving universities (at faculty or department level), with the final decision made by the university that will award the degree (normally the receiving "home" university.)

A brokerage service such as CUBER, addressing the "end user" (the student) *is not a degree awarding institution*, and it should be questioned whether the finally awarding institution *would (ever ?) accept the external accreditation of a brokerage service*. At the moment, the only instance that is willing to accept the authority of such instance is the professional world (cf. accreditation services like as the Drake company in the US, or the acceptance by industry of the validity of "Novell" or "Microsoft engineer" as the result of evaluation by an accreditation service).

There are some indications that at the longer term also the educational world might accept such accreditation. Examples are

- the fact that criteria for acceptance as a professional by professional associations (e.g. as real estate agent or stock broker) are starting to influence the Continuous Professional Development courses offered by universities;

- the interest with which also universities responded to calls for projects in the framework of LEONARDO de Vinci's (EU) skills accreditation;

- the acceptance of universities for their continuous education of the accreditation of professional skills (cf. "Validations des acquis professionels") in France).

It will nevertheless last for at least a couple of years before this might turn into common usage. It would anyhow demand for additional elements on top of the metadata within CUBER (e.g. the development of CUBER as an accepted accreditation body).

Looking to the Central and Eastern European countries, an additional element to the discussion is added: interest for collaboration of universities and training bodies of this part of the world with Western Europe is at the time (mostly) restricted to the possibility to award degrees from famous (or at least established) Western European universities through the mediation of their country/university. In other words, these

universities aim at offering programmes within their university which are (co-) awarded with a recognised degree from a (preferably high ranking) Western university. Orientation of CUBER towards Central and Eastern Europe would consequently imply that the organisation gets a similar status.

2.1.5 UNIVERSAL's Approach for the Accreditation of Learning Resources

The project UNIVERSAL (www.ist-universal.org) is an attempt to demonstrate an open exchange of learning resources (LRs) between higher education institutions (HEIs) across Europe. The business-to-business oriented brokerage will embrace offers, enquiries, booking and delivery of LRs. UNIVERSAL will enable

- a single faculty to enrich a specific course with external material,

- an existing alliance of universities (also called "cluster" in UNIVERSAL papers) to make their exchange more efficient and richer in content.

Classification of Learning Resources

Based on the IEEE Learning Objects Metadata standard, four aggregation levels of LRs resources are introduced: course, unit, lesson, and fragment.

Accreditation

One idea is to support clusters of universities, which will automatically accreditate course units (and "smaller" learning resources) among each other without going through a costly and time-consuming accreditation process. Here the idea is, not to support an accreditation process by some means such as ECTS, but to make a formal accreditation process completely unnecessary. This can only be achieved if *the appointed course instructor is empowered to select among the full range of learning resources provided within its cluster without requiring accreditation*.

Moreover, we think that constructing an exchange platform, which is completely open will not be successful in the long run, because markets tend to differentiate. Users will therefore be supported in creating clusters of higher education institutions within which automatic accreditation of LRs smaller than courses is possible.

Summarising Universal's current approach

UNIVERSAL will focus on the exchange of LRs of the aggregation level *course unit*. By supporting clusters of higher education institutions (with already established relationships) UNIVERSAL will try to achieve an exchange of LRs without requiring accreditation procedures.

However, there are also other voices within the UNIVERSAL consortium that are in favour of supporting accreditation procedures by platform functionality. This can be achieved by introducing the "evaluator" user role. An evaluator browses the platform's catalogue of LRs and accreditates those LRs who s/he thinks are suitable for his HEI. S/he is hereby supported by metadata such as ECTS credits, reviews, comments and

access rate. At the end, users of the evaluator's HEI are restricted to consume/book those resources that are marked as "by HEI accredited LRs".

It makes sense to create organisational means such as the ECTS, which will make the exchange of whole courses more efficient. However, the role of information technology (the one of an electronic exchange platform e.g.) is only a minor one here. Especially if you compare it to the organisational and political efforts on multiple institutional levels that have to be gone through in order to establish these means.

3   Conclusions

The CUBER consortium has gained a deeper understanding of the issues and problems related to using credit point systems to automate recognition of course work in other programmes.

The gathering of the state-of-the-art has shown that the situation in the different countries and institutions participating in the CUBER consortium is very heterogeneous, this reflects the overall situation in Europe.

Consequently, a number of action strands to be followed in work packages 8 (sustainability) and 9 (ECTS integration) were identified.

In Workpackage 9, a questionnaire is going to be developed to find out how and by whom recognition of single courses is currently done in the CUBER members' home institutions respective countries. Special emphasis will be given to the parameters used in the evaluation preceding a decision.

These parameters can serve to derive an extension of CUBER's metadata model. Also the current treatment of these parameters can be used as a guideline how the parameters will have to be chosen during metadata acquisition in workpackage 6.

This will be of great importance because otherwise, course metadata from different providers might become incompatible with respect to credit points and related fields due to different choices of certain parameter values.

ANNEX 1:

The CANDLE Project (www.candle.eu.org)

Collaborative And Network Distributed Learning Environment, a project within the "European Network of universities and companies in Information and Communication Engineering" (www.eunice-forum.org)

Main goals of CANDLE are to

- develop a **methodology** and set of **guidelines** for course module organisation, authoring and use of **metadata**
- develop, manage and deliver a **framework of open courseware**
- develop and deploy a **system for delivery and navigation** of courses
- grant cost-effective, on-line access to high-quality ICT courses

CANDLE could contribute to

- User Needs Analysis / requirements capture (SUNA)
- Methodology
- Evaluation
- Courseware reengineering / Courseware

CANDLE seeks support in

- Metadata specification / search tools (from *CUBER*, OR-WORLD, UNIVERSAL)
- Course organisation / delivery ... (from VOEU, WINDS)
- Authoring environment (from *CUBER*, OR-WORLD)
- Brokering platform / standardisation (from *CUBER*, LEDA, UNIVERSAL, WINDS)
- Partners for Evaluation / testbeds (later in the project) (from UNIVERSAL, WINDS)

The Analysis of User Needs is based on

SUNA - Scenario-based User Needs Analysis		
Receive Inputs & Terms of Reference		
Set up the Team		
Define User Roles	Workshop 1 (Iterate if necessary)	OUTPUTS > 1-4 Scenarios > Updated Needs Control Document
Generate Scenarios		
Elicit Common User Needs		
Create 1st cut Needs Hierarchy		
Map Technologies to Needs	Workshop 2 (Iterate if necessary)	OUTPUTS > Final Needs Hierarchy > Updated Needs Control Document
Feedback Needs Hierarchy		
Make Scoping Decisions		
List Use Case Titles		

CANDLE's Specification of Metadata

• **C-Content** (CANDLE-Content): any reusable content stored in the CANDLE system.	• **C-Metadata**: Textual information that describes a *C-Content*. It includes fields which are common both to *C-Atoms, C-Modules* and *C-Courses* (e.g. title, author name).
• **C-Atom** (CANDLE-Atom): the most elementary reusable object	• *CA-Metadata* (C-Atom specific metadata): Textual information that describes a *C-Atom*.
• **C-Module** (CANDLE-Module): composed by a set of *C-Atoms* and described by *Metadata*.	• *CM-Metadata* (C-Module specific metadata): Textual information that describes a *C-Module*.
• *C-Course* (CANDLE-Course): composed by a set of *C-Contents*	• *CC-Metadata* (C-Course specific metadata): Textual information that describes a *C-Course*.