Digital Rights Management (DRM) in Education - The Need for Standardisation

A Briefing Paper for IMS

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1 Overview

The education sector is both the major creator of Intellectual Property (IP) as well as the major consumer of its own IP and that of other parties. The education sector produces significant amounts of IP each year which often represents a substantial commercial opportunity. A major obstacle to this opportunity is usually the lack of campus-wide management systems for these valuable learning objects.

Digital Rights Management (DRM) is an emerging solution to the problem of managing intellectual property rights over learning objects including identifying rights holders, the applicable allowable permissions, and tracking usage.

The immediate opportunity for the IMS Global Learning Consortium is to develop a strategy and technical solution for supporting DRM in the emerging Learning Object management community. Failure for the sector to develop its own coherent strategy for DRM will see externally developed, and often inappropriate, strategies and technologies applied by default.

It is acknowledged that the development and trade in learning objects is still in its infancy and that it is more "talked-about than-done". There is no doubt, however, that the emergent learning management systems and learning content management system together with content management systems for Web resources offer the systems capability for a high degree of interoperability and they offer a solid context for the incorporation of DRM solutions.

The challenge now is to develop information architectures and a systems framework encapsulating the complexities of the scenarios envisaged in the education sector. There are no easy answers to this challenge and a great deal of work now has to be done in developing appropriate standards and protocols to facilitate the incorporation of DRM as an integral part of the systems component framework.

This briefing paper provides:
- an overview of DRM in the Education sector, and
- a proposed outline of an IMS DRM work item.

2   Digital Rights Management (DRM) and Education

2.1   Introduction

Digital Rights Management (DRM) has traditionally been focused on security and encryption as a means to solve IP management. That is, lock the content and limit its distribution to only those who pay. This is what is being referred to as "first-generation DRM" and represents a substantial narrowing of its real and broader capabilities. DRM is now being defined to cover the description, identification, trading, protection, monitoring and tracking of all forms of rights permissions, constraints, and requirements over both tangible and intangible assets including management of rights holders relationships. This is the "second-generation DRM" [Iannella, 2001] in which the management of assets is driven from DRM.

2.2   Accretion of Knowledge

A key feature of managing knowledge in this decade will be the substantial increase in serial re-use of learning objects. There will be substantial economic and time to market pressures which will require organisations to implement cost effective mechanisms to enable other parties to add value, extend or adapt and aggregate the original learning objects. Figure 1 shows this effect of a connected marketplace requiring a connected supply chain.
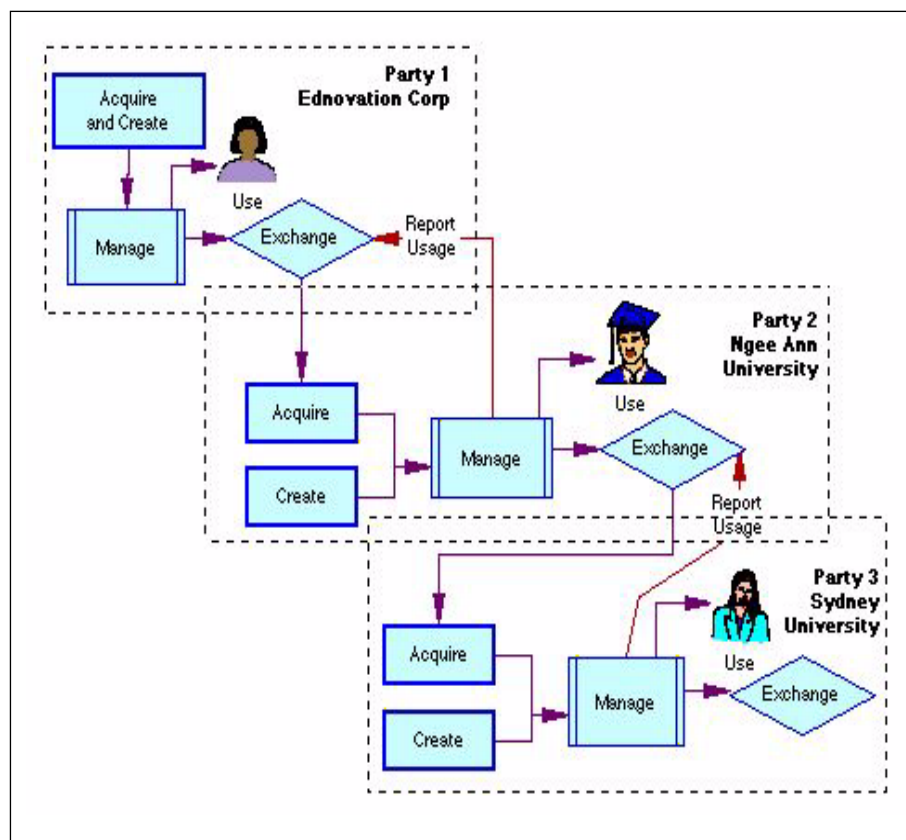

Figure 1.   Knowledge Accretion

2.3 The "Layered" view of Rights

Rights and obligations are the key concepts behind Intellectual Property (IP) and Contract Law. Every physical or digital object that is managed or exchanged embodies layers of rights. Each layer of rights in an object is nominally associated with a "role" and can be licensed, sold or assigned (all are forms of transfers) to others with conditions attached.

For instance:

- A painting has a bundle of layers of rights normally associated with it.
- An individual has rights as a citizen, as an author of a work and as purchasers or things etc.

The right to "publish" a research paper is held by the person with the role of "author", it may be transferred to the identity with the role of "owner", very often a University, and then transferred to an identity with the role of "publisher".

A researcher may have assigned all the rights in a research paper in order to get it published to complete a Research Grant condition. However, she could have instead licensed a discrete, thin layer of her overall bundle of rights. This could have just covered a printed journal publishing right, in English, in Australia, for a given period for just about the same amount of money (which is often zero). She would then have preserved some layers of rights, eg digital publication, other languages and jurisdictions, to license to the University where she works and reserved the remaining layers to herself.

A party that can define a new layer of right has potentially increased the value of the works they hold to which that layer can be applied. If another party will pay for this newly created right then it has validity and a value. Therefore any system that manages, exchanges or trades intellectual property must be able to handle the creation, management and transfer of many different layers of rights in objects over time and between many different parties.

2.4 The Pricing of the Transfer of a Right

The particular price that is established for a specific right would be based on specific characteristics of User, Usage and the Confidence level or measures that could be expected.

As an example, a rights-managed on-line service for learning objects will need to provide various level of access on demand:

- Part or all of a work can be viewed on screen. i.e. It cannot be printed or saved.
- Part or all of a work to be downloaded and for a pre-agreed quantity to be printed with a personalised watermark.
- Part or all of a work to be downloaded as text only for embedding in another work.
- Part or all of a work to be downloaded and an agreed number of parts can be re-used in another work for a fee.

2.5 DRM and Online Learning

Over the course of the academic year, education institutions produce, for their internal use in teaching and tutoring, hundreds of thousands of projects ranging from small Java simulations on "cell biology" to complete on-line courses.

Their museums and libraries hold hundreds of thousands of objects which could also be used to support learning and research once properly digitized, catalogued and managed.

Each institution is independently working to provide resources, often for up to 200 courses, to its faculty and students. In a time of reduced educational funding this is a substantial resource commitment.

Many of these objects created for one module are useful to other teaching institutions, colleges, universities, companies, and schools, providing a cost-effective way is found to promote, describe and facilitate the trade or exchange of these objects.

To date the practice of re-use in learning objects has not been widespread because the quality, administrative, contractual and financial costs of finding, negotiating and integration are seen to be greater than the potential saving from re-use. For re-use to become widespread it has to become very simple and efficient to do with high commercial, learning and technical certainty.

Promoting the exchange and re-use of quality learning objects, while respecting and rewarding the intellectual property of the various contributors, are the two key issues which have to be addressed before on-line learning can become cost effective and widespread. This involves the management of both the "chain of title" of unchanged works and the sharing of rewards from accretion contributions.

The education sector has some unique characteristics when dealing with DRM. Firstly, the creation of content (Learning Objects) usually evolves over a longer period of time and often involves the re-use of other parts of LOs. Thus, the management of LOs requires a long-term strategy and involves both the "upstream" creation and "downstream" use information. Secondly, the learners (users) have a stronger level of trust being part of an existing infrastructure relationship.

Existing processes and systems for the creation of Learning Objects will need to be augmented to support DRM services. Early investigations are being undertaken in the Le@rning Federation [SOCCI, 2001], Higher Education [DEST, 2002], and the Collaborative Online Learning and Information Services [COLIS] projects.

Learning Object creators will need guidance and awareness to the benefits of these additional requirements as it may require a profound change in the approach towards content creation and re-use in the education sector.

3   Digital Rights Management (DRM) Work Item Plan

Outlined below is the proposed objectives and draft charter for the IMS Digital Rights Management work item.

3.1 Objective

The objective of the IMS Digital Rights Management work item is to develop a cohesive framework of open DRM standards for the management of rights-enabled Learning Objects (LO). The DRM framework will support the full lifecycle of Learning Objects including creation, acquisition, use, and re-use. The DRM framework will also address obligations to rights holders and both upstream and downstream rights information.

It is envisaged that entities within the Learning Object Management System (LOMS) framework (as depicted in Figure 2) will support the expression, management, and control of rights information attached, or available, to LOs.
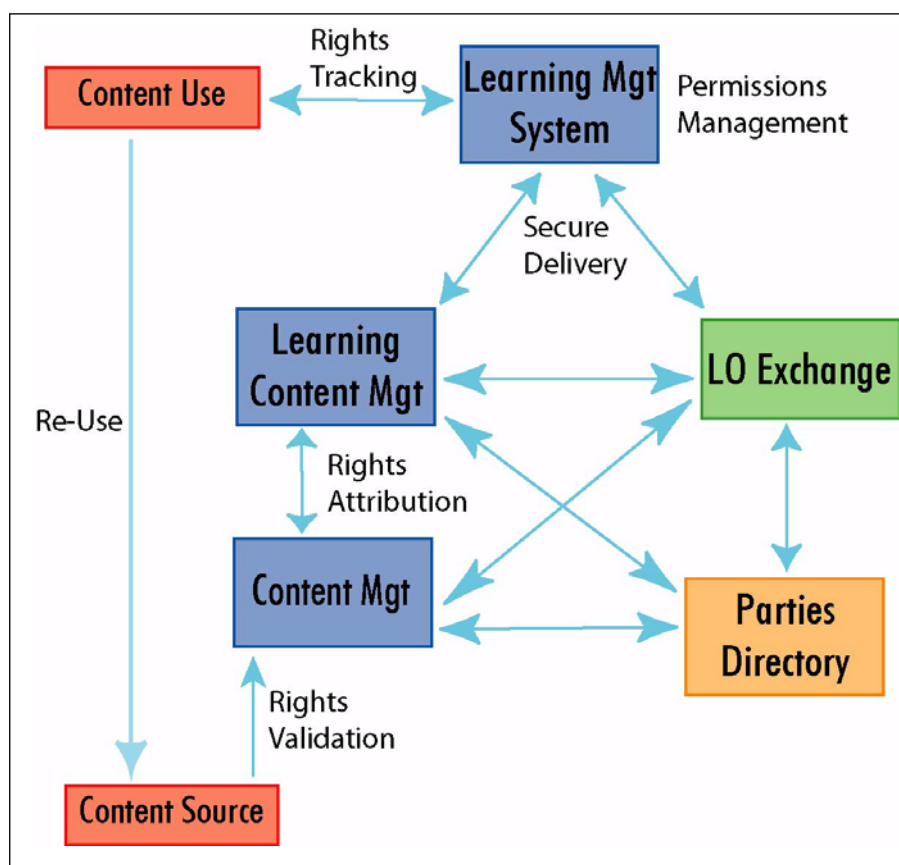

Figure 2.   DRM LOMS Framework

The DRM LOMS Framework will need to support both intra and inter-enterprise operations and trust regimes. That is, third-party LO Exchanges may provide content to various LOMS entities.

3.2 Scope

The first phase (in 2002) of the DRM work item will focus on the development of a Rights metadata language for expressing DRM information relevant to LOs. The Rights language will be the critical foundation upon which other DRM services will be layered.

It is envisaged that the DRM work item will review and adopt the Rights language model afforded by the Open Digital Rights Language [ODRL]. The ODRL information model, shown in Figure 3, consists of the following core entities:

- Learning Objects - uniquely identifiable content at any level of granularity (may include Encryption information for secure asset delivery).
- Rights - the rights information consisting of:
  - Permissions - actual usages allowed over the Learning Objects,
  - Constraints - limits to these Permissions,
  - Conditions - exceptions to control Permissions, and
  - Requirements - obligations needed to exercise the Permission.
- Parties - include end users, roles, and Rights Holders who can assert some form of ownership over the Learning Objects and/or its Permissions.
- Offers - proposals from Rights Holders for specific Rights over their Learning Objects (usually to end users).
- Agreements - when Parties enter into contracts with specific Offers.
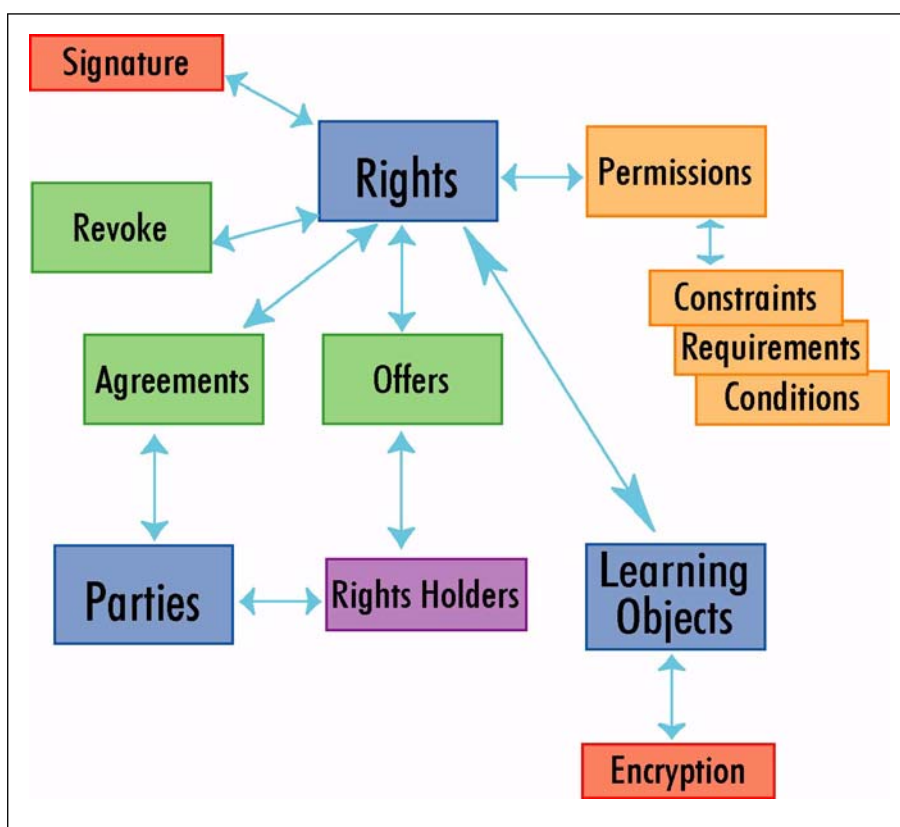

Figure 3.   Rights Language Model

Using ODRL as the core expression language, the primary activity will be to define any additional terms for the Permissions/Constraints/Requirements/Conditions that are specific to LOs and/or the education community.

Latter phases of the DRM work item may address the following:

- Trust model for LOMS
- Security and Encryption of Learning Objects
- Trading systems for LO exchanges.

The DRM work item will not be addressing the following:

- The teaching and learning outcomes from the use of DRM-enabled learning objects.
- Legal issues over copyright application and compliance.
- Ownership of material developed in the education sector.

3.3 Approach & Deliverables

The DRM- work item will begin by validating the DRM LOMS Framework and Rights Language Model as this will form a core part of the deliverables. Requirements from the education sector will be gathered and analysed as part of this validation process. These requirements will be based on typical scenarios and use cases.

The core deliverables will include the base documents:

- DRM Language Model,
- DRM Language Binding, and
- DRM Language Best Practice.

The DRM Language Model will include the education-specific terms that will form the vocabulary used in the expression language.

The DRM work item is closely related to the following IMS working groups:

- Enterprise,
- Digital Repositories,
- Metadata,

as their relationship and overlap with DRM is critical to enable a cohesive set of IMS specifications for the education sector.

The working group responsible for the DRM work item should also establish a liaison with the OpenEBook Forum [OEBF] as they are currently developing a grammar for a Rights language. Compatibility between IMS and OEBF would also be crucial for the publishing market acceptance and deployment of rights-enabled LOs. Other liaisons maybe formed as necessary.

During the development of the Rights language, the DRM work item will reflect any modifications to the model and framework and document potential Phase Two activities.

3.4 Key Milestones

The key milestones for Phase One of the DRM work item include:

Date	Milestone
Mar 2002	Submit Scoping Document for approval of the IMS TB
Mar 2002	Scoping Document approved by the IMS TB
Apr 2002	Commence work item and invite participation
Apr 2002	DRM meeting (with April/May IMS WG Meeting)
May 2002	First release of draft Base documents
Jun 2002	DRM meeting (Australia)
Jul 2002	Second release of draft Base documents
Aug 2002	DRM meeting (with August IMS WG Meeting)
Sep 2002	Interoperability guide with other IMS standards
Oct 2002	Third release of draft Base documents
Nov 2002	DRM meeting (with Nov IMS WG Meeting)
Nov 2002	Present final Public Drafts to IMS TB

In December 2002, the DRM work item will develop a work-plan for Phase Two activities.

4 Conclusion

4.1 Why the Urgency to form the Rights Work Item?

Education is the characterised by the re-use of material from many different media sectors:

- Text with Books, Journals and Newspapers,
- Video with documentaries, video streams and lectures,
- audio, and
- software.

Some of these sectors are dominated by large corporations seeking to entrench into the digital infrastructure the requirement that all usage of their content is absolutely controlled and paid [Lessig, 2000]. If the online education sector does not quickly establish its own royalty-free Rights Language standard that suits its needs then it will by default become a "taker" of copyright enforcement centric approaches. It will have left a "policy and technical vacuum" that the media sector will delight in filling for them.

Once a Rights Enforcement Language has become entrenched it will be almost impossible for at least 10 years to substitute a rights description language that supports education re-use, free use and low friction mechanisms for sharing and exchanging.

All media-oriented standards bodies are currently assessing Rights Languages. IMS has less than six months to establish and publish their foundation requirements.

4.2 Moving Forward

DRM is poised to become a critical issue for on-line learning and information communities. The effective development and utilisation of on-line learning content will require flexible and expressive DRM solutions. The challenge therefore is to develop effective mechanisms for managing on-line learning content and to foster the collaborative development of DRM solutions.

The IMS DRM work item would establish IMS as the centre of expertise for DRM in the global education community. We strongly urge the IMS community to agree to forming the DRM work item and begin this challenging new chapter in IMS history.

Appendix A: References

[COLIS]   Collaborative Online Learning and Information Services
            <http://www.colis.mq.edu.au/>

[DEST]   *Digital Rights Management (DRM) in the Higher
            Education Sector,* Department of Education Science and
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[Lessig]   *CODE and other Laws of Cyberspace*. Lawrence Lessig,
            Basic Book, June 2000

[ODRL]   Open Digital Rights Language (ODRL) Initiative
            <http://odrl.net>

[OEBF]   OpenEBook Forum
            <http://www.openebook.org/>

[SOCCI]   *SOCCI Digital Rights Management (DRM) Business
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            *SOCCI Digital Rights Management (DRM) Systems
            Requirements Specification (SRS).* IPR Systems, Version
            1.1.1, 25 May 2001