Geronimo's Cadillac: Lessons for Learning Object Repositories

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Abstract. Much of the work devoted to developing learning objects and repositories has, to date, been driven by technical considerations. This work is very important. However, this paper discusses the importance of understanding the context of application for learning object repositories and argues that their successful adoption by the educational community will require careful attention to the issues of professional and organizational change. We identify a major driver for this change in the different philosophies that are inherent in these technologies compared to current practices in terms of business models, ideologies, pedagogies and epistemologies. The central theme of this paper, that the component parts revolve around, is that the most challenging aspect of e-learning is really about "Change Management" – made even more difficult because it is not perceived as such. The ideas behind this paper are based on a synthesis of ideas from pedagogy, systems theory and software engineering. These are illustrated in the approach of the UK TrustDR project that is examining practical ways of managing IPR (Intellectual Property Rights) in institutional learning object repositories.

Introduction

The lesson we refer to in the title of this paper1 and epitomised in the phrase "Geronimo's Cadillac" – is that of trying to use technology in an area that is not yet ready for it, as this extract from a training document produced by Digitalinsite® explains:

"Geronimo, last free leader of the Apache nation agreed to a peace treaty and was sent to live on a reservation. As a peace offering the US government made a gift to Geronimo of what was at that time one of the most advanced items of technology they had – a new Cadillac motor car. The trouble was that on the reservation there was no one who could drive, no mechanics, no oil, no petrol and no roads. Geronimo was forced to pose in it for photographs but after this the car was used as a chicken coop."
www.digitalinsite.co.uk

The TrustDR project (http://www.uhi.ac.uk/lis/projects/trustdr/index.html) is investigating the technical legal and cultural factors that need to be understood in order to find practical ways of creating Digital Rights Management (DRM) systems for institutional repositories of learning objects. The management of IPR in e-learning currently poses a serious challenge to the educational and public sectors and, it is fair to say, the outcomes of the project are keenly awaited. The project is funded by JISC (Joint Information Services Committee), the UK government body responsible for developing the use of technology in the service of education. The project is just over half way through its two-year life and has wide-ranging aims including the provision of 'Institutional Development Packs' that will provide a range of tools and support materials to those involved in implementing DRM in e-learning. It quickly became apparent to us that DRM in e-learning shared many of the general problems associated with the implementation of e-learning in general – particularly the largely unexplored area of organisational change and development in this context. E-earning is still in a relatively immature stage and operates in a manner that reflects the ad hoc bottom-up nature of our educational institutions and their professional cultures. The great unresolved issue regarding the sustainable adoption of e-learning is that these technologies carry a strong centralising and corporate business model [1] that is in tension with existing practice. Until this tension is resolved we are

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[1] A footnote from history - This episode was immortalised in 1972 by the Irish American songwriter Michael Martin Murphey who released an album and a song called *Geronimo's Cadillac*."

not likely to see e-learning being successfully embedded into practice. We have found in this respect that the legal issues in learning materials are acting as a 'lightening conductor' that bring to the surface many difficult problems regarding power and ownership, status and control.

This paper may surprise the reader who is expecting a concentration on the more legal and technical aspects of DRM in the project. We do indeed cover these issues in our project work but we also need to have a sound and clearly articulated understanding of 'the business of e-learning' – as it is and as it might develop. The reason for this is simple; setting up a DRM system in any environment is potentially problematic and expensive, but in the education sector that is rapidly changing and   has had little experience in the IPR area until now this is especially challenging. To make practical and workable suggestion for implementing DRM, as this project aims to do, we need to have a firm understanding of the business it is being applied to and not content ourselves with an abstract legal or technical study or accept all the 'spin' that is sometimes put on e-learning activity to satisfy commercial and political agendas and funding opportunities [2]. This 'systems' approach would be normal in any commercial project and we think it is especially applicable to the area of e-learning. As Tom Boyle [3] and Norm Friesen [2] and point out there is a need for more studies of these aspects of the application and uses of learning objects and repositories.

We seek to align our work as part of a process that sees the future of e-learning developing from its current state in to a more mature and organisationally coherent activity. In this paper we set out some of the salient factors that we think are important to understand about the education sector, e-learning and learning objects and examine how these might help shape the operation of learning objects repositories as digital libraries.

E-learning and Learning Objects - The Current Situation

This section highlights the importance of taking the local context and culture into account when developing and implementing technological solutions in complex social systems like education. The failure of the government-backed UK e-U virtual university being a case in point. Many of the failures in software development and engineering are down to this basic error – i.e. of not understanding the needs and situation of the users. In 1994 the Standish group published a report entitled 'The Chaos Report', on the state of the software industry that found that the single largest cause of project failure was a lack of user consultation. A significant finding was the inability of the industry to learn from its mistakes, comparing the discipline of software engineering to that of construction and civil engineering they make this sharp criticism:

"When a bridge falls down, it is investigated and a report is written on the cause of the failure. This is not so in the computer industry where failures are covered up, ignored, and/or rationalized. As a result, we keep making the same mistakes over and over again."

The report can be found at: http://www.standishgroup.com/sample_research/chaos_1994_1.php

It is worth while pointing out that having a shared, centralised, digital, collection of teaching materials is currently a very rare occurrence in most of our institutions and that the kind of shared teamwork in teaching that such a model implies does not routinely exist either [4]. Even rarer are any actual working and used institutional repositories of learning objects, while implementations of Learning Design are still at the experimental stage. Until recently, we have been building infrastructures, creating content, and developing technical standards and architectures etc, in the assumption that the 'soft issues will take care of themselves'.

The alt-i-lab 2004 document *Repository Management and Implementation: A white paper* [5] makes the observation that there is an assumption that a shared collection of learning objects is what people want but that this assumption may be based on a rather thin premise. It points out that much work has been done that focuses on technical issues but that even the 'techies' acknowledge that there are many questions relating to culture, politics, and practice that remain to be addressed, such as pedagogic tradition, professional working cultures and institutional structures and values. They go on to stress that the drive towards technical interoperability must be accompanied by a reassessment of these broader issues.

In the mid 1990's Terry Mayes [6] in an article called Groundhog Day looking to the future of learning technology (http://apu.gcal.ac.uk/clti/papers/Groundhog.html) makes these points:

"Thus, there are good reasons for supposing that today's learning technology will this time lead to radical change in education. Yet doubts remain. For one thing education is a social and political system, and the checks and balances that keep the system working may not be shifted by any technology. Secondly, current learning technology may not be well-matched to real user needs. Here we ask, not how powerful is the technology, but where is the learning need?"

Educational institutions are complex entities and the mere fact of introducing technology into them can provoke problems and bring hitherto hidden issues to the surface (a reification). In research finding funded by the ESRC that foreshadowed the later collapse of the Uke-U (Britain's first government-backed virtual University) Pollock and Cornford [1] make the useful observation that often these technologies carry strong implicit organisational and business models. Norm Friesen [2], who has been heavily involved in e-learning standards work gives a good description of these implicit models (including some of their military origins) in an often-referenced paper called *Three Objections to Learning Objects and E-Learning Standards* and calls for more research into this area especially into an examination of their pedagogical and epistemological and ideological implications.

These implicit models, we would argue, are the cause of most of the confusion and failure in the world of learning technology to date. Casey et al [4] explores these themes in some more detail in particular relation to learning objects and Learning Design and examines ways of resolving them. Professor Mark Stiles [7] has done some very useful work, including case studies, to identify the role of policy development in driving the required cultural change with particular reference to the need for top down management involvement – currently a largely ignored area in the UK.

To date e-learning has not been as successful as some have wished. There are many reasons for this but a consensus is building around the idea that educational institutions and the professional cultures of those working in them have to change in a fundamental way in order to make effective use of the technology. Without this change, not surprisingly, the result is often not satisfactory as van der Klink & Jochems [8] put it:

"The current situation can be best described as high-level ambitions with poor implementation."

The Information Management Failings of the E-learning Community

Our ability to curate (i.e. to look after and exploit) digital learning materials has to date been poor with materials from publicly funded schemes falling into technical obsolescence or just being lost, the £40 million UK Teaching and Learning technology Programme2 (TLTP) programme is a good example of this. Partly because of this experience national initiatives like Digital Curation Centre3 (DCC) the national UK JORUM4 learning object repository have been set up. Now, useful work is being done on ways to 'resurrect' obsolete materials from the TLTP by the RECAL5 project. It is also only relatively recently that serious consideration has been given to managing the IPR in digital learning materials. This was largely due to the JISC funded Exchange for Learning6 (X4L) programme which ended phase one in 2005, it set

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[2] http://www.le.ac.uk/tltp/
[3] http://www.dcc.ac.uk/
[4]http://www.jorum.ac.uk/
[5] http://www.recal.mvm.ed.ac.uk/
[6] http://www.jisc.ac.uk/programme_x4l.html

out to investigate the issues surrounding regarding reuse and learning objects. Outstanding factors that we need to emphasise at are a] the general lack of institutional management of IPR in learning materials which is evidence of the dominance of the bottom-up activity model for e-learning and b] the lack of involvement of the one group of staff, institutional librarians, that have the skills, interest and indeed official responsibility to be able to deal with this.

Another ongoing problem with our ability to look after and preserve digital materials is an apparent reluctance to fund the creation of adequate metadata; the experience of the Yorkshire High Level Skills for Industry repository [10] and the research work of Currier et al [11] are particularly instructive in this regard. Yet recent discussions on CETIS mail lists and elsewhere7 reveal a continuing aversion to spending some time and money on creating metadata and the belief that there may be some technical panacea to remove this tiresome burden. The reluctance to create metadata even endures when we have projects that are paid to create materials from scratch to deposit in repositories. There may be a number of reasons for this but one that stands out for us, is that in institutional terms the role of librarians and information professionals has been sidelined and downgraded in favour of IT services since the inception of the world-wide-web. Typically, IT departments have little expertise in the area of information management – but believe they do. Metadata creation, cataloguing and classification may not be currently fashionable but it does provide an essential means to find materials and avoid 'digital oblivion', and these activities are the natural preserve of librarians. Yes, some of the proponents of the application of detailed metadata schemas seem to be at a distance from the economic reality facing most of us but that seems equally matched by those who seem to believe in rather utopian solutions involving Artificial Intelligence etc. We would argue the future lies between the two extremes8. Those who have recovered from their 'AI hangover' now advocate using technology to support human intelligence in dealing with these kind of problems which is well fitted for dealing with complexity and multiple meanings – and resolving them. We believe the future of e-learning will consist of humans, assisted by technical agents; operating and maintaining networked e-learning systems.

Holding up a Mirror to our Practice

In this confused situation we need help to understand the 'problem space' that e-learning represents. It would be very useful if the different actors involved could use a model as a way of sharing and negotiating meaning across the boundaries of their 'communities of practice', [12] especially if those actors have traditionally had little or no meaningful communication or negotiation in the past - as is often the case in UK educational institutions. For our purposes the model should be:
- Simple and easy to grasp – easy definitions
- Adaptable and extendable – i.e. facilitate customisation to local contexts
- Have some level of shared abstraction that is meaningful across the different groups – thus hopefully providing a 'bridge' for the negotiation and sharing of meaning.
- Support textual and graphical representations

What to model and why?

The short answer to this question is that in order to understand how to successfully implement e-learning in our organisations we need to understand how they work in the first place in order to change them effectively. The drive towards the kind of analysis of workplaces that we are advocating derives from systems theory. Yet such an approach to management and planning is often very difficult because the

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7 http://opencontent.org/blog/archives/256
8 We would like to acknowledge Prof. Rob Koper of the Open University of the Netherlands for making this useful observation about AI and its uses during a meeting of the UNFOLD IMS Learning Design project in Barcelona 20-22 April 2005

individuals at different levels in an organisation find it difficult to conceive of the 'bigger picture' due to the local detail of their own situations and working cultures.

To overcome this obstacle, modern systems theory seems to offer some help. It provides some useful analytical tools for identifying and understanding the dynamic relations between the factors we have been discussing in this report. Senge and Sterman [13] develop this theme in the context of Organisational Learning - a concept that is very relevant. They propose a 3-stage process for developing a better understanding of how an organisation actually works by the people within it:

1/ *Mapping mental models* - explicating and structuring assumptions via systems models;
2/ *Challenging mental models* - revealing inconsistencies in assumptions;
3/ *Improving mental models* - continually extending and testing mental models.

They make the important point that flaws in the understanding of how an organisation works cannot be corrected until they are made explicit, which is the purpose of the modeling exercise. There is no reason to think that such an exercise could not be applied to higher education.

Corben et al [14] are clear about the benefits of this kind of process, which they describe as 'qualitative mapping':

"The method forces rigorous thinking and provides a good compromise between the context-free approaches of most high level approaches to change management, and the detail and clutter of most low level approaches to business process re-engineering."

In developing our model we have found the ideas, approaches and concepts in *Integrated E-Learning* introduced by Jochems, Merriënboer & Koper [15] very useful, especially those of van der Klink & Jochems relating to organisational issues [8]. This model also draws on recent work by Collis & Moonen [16] and Normand & Littlejohn [17]. All these researchers propose analysing and viewing the functional institutional structures at three levels to situate the perspectives of the relevant 'actors' who are involved in providing and supporting e-learning in an institution. In addition van der Klink & Jochems [8] suggest adopting 4 'perspectives' at each level, those of; organizational context, strategic plans, pedagogy and technology. On this conceptual basis we have come up with a simple yet comprehensive organisational model that is intuitive and can be easily adapted and extended to describe most educational institutions – we represent it graphically in figure 1. The organisational model might also usefully fulfill an analytical and diagnostic role for those tasked with implementing e-learning in an institution – opening up the intriguing possibility of representing the dysfunctional aspects of an institution in relation to the chosen aspects of e-learning.

The model is simple but powerful and provides us with a way to break down the functions of our institutions into manageable 'chunks' and gives us a way of representing internal relationships. It also gives us a framework to support and express our ideas for policy targets that we are working on and to begin to articulate our ideas for possible implementation. But the most important thing about this model is its ability to support dialogue between different groups and create simple analytical tools based on the grid in figure 2. In this way the model fulfills the role of a 'boundary object' that can carry meaning between different groups as described by Wenger [12]. This approach has some similarities with that of creating Use Cases in software engineering as a means of understanding a system and gathering requirements.

But we should also provide a health warning about models and indeed all representations of complex organisations - they are fictions and should not be mistaken for reality (a common mistake in project management for instance). But they are useful fictions if they allow us to get closer and understand the reality of what we are examining. The model presented here is a useful generalization – it has to be adapted and 'tweaked' to the specifics of a local situation. As we shall show it can be the source of a variety of useful analysis and communication tools. Potential uses are as numerous as the variety of contexts under examination, but some stand out: 'round-table' discussion aids, planning tools, and a useful form of 'institutional memory'. One final warning, no model or tool can make individuals or departments communicate and cooperate and the mere application of the model etc. such should not be confused with

improvements in the organisation. In other words this model is not a panacea to make dysfunctional organisations whole again – but if used correctly can help identify those aspects of the organisation that need to be changed.

The diagram below in Fig. 1 illustrates the model with the three hierarchical levels combined with the four different perspectives to provide an integrated whole. The fact that the 3 levels of institutional organisation are in alignment indicates that they are working well and coherently to deliver e-learning opportunities – the vertical lines indicating channels of communication around certain perspectives or views. Where the vertical lines intersect at the corner of the squares represent those activities and perspectives at each institutional level. The significance of each of the perspectives will naturally vary across the different levels of any institution

The model can be used to produce a series of grids, matrixes and other representations that enable us to record succinctly and in an easily shareable manner the different aspects of the institutions we want to describe and analyse. We can start with a 3 column by 4-row grid as shown in Fig. 2 and use that to derive a set of tools. We have used these tools to help analyse and evaluate a number of different organisational factors relating to implementing a DRM system. The current set of tools with their working content can be found at this web address: http://www.uhi.ac.uk/lis/projects/trustdr/work_in_progress.html under the heading of WP SP2 Organisational Modelling Framework - Analytical and Evaluation Tools.
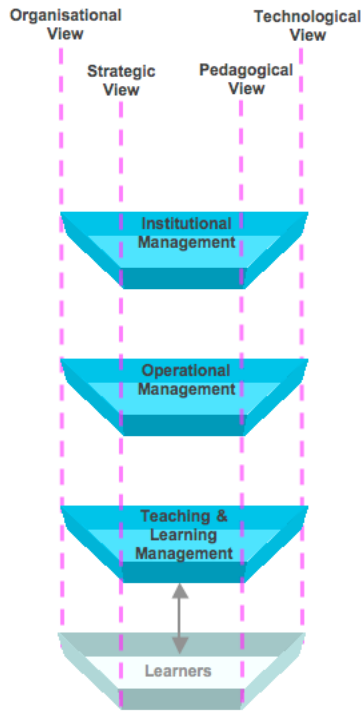

Level / View	Teaching & Learner Management	Operational & Curricular Management	Institutional Management
Pedagogical			
Technological			
Organisational			
Strategic			

Fig. 2 Simple Analysis Grid Derived from the TrustDR Organisational Framework

Fig.1 The TrustDR Organisational Framework for e-Learning

Looking Forwards – Positive Signs

So, where can we look for guidance? As van Rijsbergen [18] puts it:

"The information retrieval community is a good candidate, representing a fruitful if sometimes tense collaboration between information science, computer science and librarians"

If we can agree that an institutional digital repository of learning objects is a form of digital library then Sølvberg [19] proposes three criteria that a such a repository should share with a traditional 'bricks, mortar, and books' library, they are: permanent, managed, quality controlled. This coincides nicely with research about metadata quality and management issues [11] and gives us a big picture' view of how a repository should fit into existing institutional structures.

The issue of permanence is an important one for the e-learning community to take on board and one that the library community can help with. In the UK since the 1980's e-learning activities have been characterised by short-termism and a 'not invented here syndrome'. There are signs that this is beginning to change, the launch of the national UK learning object repository, as a permanent service is an indicator of this.

Another useful perspective is that expounded by Cliff Lynch of the Coalition for Networked Information at a JISC meeting in Brighton in 2004. The concept is simple but profound – the previously separate activities of education, publishing, libraries and archives and IT services are coming together to occupy the same digital space. These activities and their constituent professions and cultures are, however, still operating separately. This needs attention.

Another useful source of wisdom and expertise is that of the museum community – that has been taken onboard by the establishment of the UK Digital Curation Centre. A lot of thought went into their choice of title; a curator is someone who looks after a collection of items but also actively seeks to make use of them in order to bring extra value to the collection.

So the future organisation of a digital library of learning objects needs to include all of these roles and perspectives and perhaps most importantly be engaged with the changing model of education. We believe that central to this is the need for the library profession to engage with the domain, they have a particularly important customer service/community role to play that IT departments struggle with. Developments in the Irish context are encouraging. In contrast the situation in most of the UK might be described as a librarian-free environment[9]. At Ulster University this involvement is embedded in policy that dictates librarians have to be involved in compiling and checking the resource lists for course in the institutional VLE. This simple arrangement is an important signifier of a move away from bottom-up ad hoc activity to a more organised and team-based approach that is required. This arrangement makes possible the beginning effective IPR management and the creation of a workable institutional DRM system, we would also argue that it would enable a more sustainable model of e-learning than is now the case.

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