

# A critique of Becta's policy on learning platforms

Crispin Weston  
Alpha Learning  
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**Appendix A. Proposed model for grouping information.**

**Appendix B. Proposed architecture for learning platforms.**

# 1. Summary

Since at least 1997, the implementation of e-learning in schools has been mismanaged. A series of top-down initiatives have been introduced without a thorough analysis of the particular requirements of e-learning in schools. Becta's proposed new procurement of learning platforms continues this tradition. It will be counter-productive should be cancelled.

Becta must redefine its role. It should not seek to dictate solutions to schools but should try to ensure that there is a vibrant, flexible, well-informed and fair market which will encourage innovative solutions to emerge from industry, in response to demand from the profession.

The principle prerequisite of a vibrant and fair market is a robust framework for plug-and-play interoperability. This will allow innovative products and content to emerge in particular sectors, without being stifled at birth by a dependence on powerful interest groups, either in industry or the public sector. In order to establish and police such a framework, Becta must ensure that it is employing people with genuine expertise, who are able to engage with the technology involved in standards for interoperability.

Too often, Becta's strategic thinking is expressed in vague, platitudinous and impenetrable language. Establishing a framework for interoperability will require the development of a clear architecture and a clear timetable based on genuine consultation with both industry and the profession.

## 2. Background

### 2.1. Learning Platforms

#### 2.1.1. Types of Learning Platform

The term 'Learning Platform' was coined by the Curriculum Online department in 2002. It was designed deliberately to provide an imprecise umbrella term which would include a wide variety of different systems. There are, broadly, three views of what a learning platform is.

- 1 A collection of stand-alone web-based tools, designed to encourage collaboration (discussion forums, chat-rooms) and communication (email). Being self-sufficient, these applications have a limited need for interoperability.
- 2 Repositories for learning content, allowing students to find on one site most of content they require, using conventional web paradigms of browse and search. This is the main model implemented by LEAs and RBCs. It has limited requirements for

interoperability. Beyond student usernames and passwords, repositories are principally interested in content which can be imported easily to the site using the IMS Content Packaging standard.

- 3 A deployment infrastructure for learning objects. The best term for this model is 'Learning Management System' (LMS). An LMS provides a 'player' rather than a 'container' for content. It can provide access methods such as assignment and sequencing, giving control to the classroom teacher, rather than traditional browse and search which leaves control with students; it can track student performance and competency; can provide back-end data services supporting book-marking, the maintenance of student preference and competence data, and the management of initialisation data which helps learning objects run in accordance with teacher preferences.

This paper concerns in particular the third of these definitions, which will be referred to as an LMS, to distinguish it from most currently available systems, commonly referred to as Virtual Learning Environments (VLEs), which are generally based on a combination of the first two models.

### **2.1.2. Reasons for scarcity of LMSs**

#### 2.1.2.1. LMS-content impasse.

LMSs run content which is distributed as interoperable learning objects (see *2.3.3.3 Learning objects, SCOs and SCAs*). It is not commercially viable to produce learning objects until there are LMSs deployed in schools to run them. Conversely, it is not commercially viable to market LMSs until there is a critical mass of learning objects on the market.

#### 2.1.2.2. Inadequacy of interoperability standards.

In business implementations, LMS and content are generally installed at the same time by the same provider, who can tweak the two to ensure they work properly together. In the schools sector, where relationships are multilateral, standards for interoperability must be more robust. This will require a public authority to define the data models and to ensure that interoperability standards work in a multilateral, competitive environment. See *2.3.2 Plug-and-play*.

#### 2.1.2.3. Opposition to content driven systems.

There are two, possibly connected, grounds for opposition to content-driven systems:

- That content-driven pedagogies are transmissive, instructionalist, or behaviourist. This objection is largely a function of the quality of much current learning content, which tends to be highly expositive. One of the chief benefits of LMSs is that they will

provide an infrastructure which will encourage the production of more innovative content, incorporating interactive and collaborative pedagogies (see *2.2.2.1 Content is king...*).

- That self-authored content is preferred in theory, as it gives the teacher more control over the way in which the curriculum is presented to students, while in practice, teachers find the need to populate systems with their own content to be very time-consuming. It is a primary function of the LMS to put the deployment of digital learning content under the management of the teacher, by supporting assignment and re-sequencing, as well as allowing learning objects to be developed which behave differently in different contexts, depending on what initialization data is passed. Advanced reusable learning objects will be indistinguishable from high-level authoring tools, giving the teacher a combination of power, flexibility and ease of use.

#### 2.1.2.4. A lack of innovation.

Any visitor to BETT will be struck by the number of small companies, often set up by teachers, marketing innovative software products. As Diane Laurillard observed in *Towards a Unified eLearning Strategy*<sup>1</sup>, this energy is not translated into workable solutions in the classroom.

- Innovation is often seen as threatening by established interest groups<sup>2</sup> which are strongly entrenched in the centralised bureaucracy of education. The learning platform as content repository has been popular with RBCs and large educational suppliers, who, by seeking to provide a one-stop-shop to schools, hope to make themselves indispensable. *Harnessing Technology* contains an enormously long list of 'partners'<sup>3</sup>. The main consequence of such a complex network of partnerships is not to enable but to prevent change.
- While the eLearning Credit scheme flirted briefly with a market-driven model of software purchasing, the current mantra of

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<sup>1</sup> 'Examples of genuine pedagogic innovation...are few in number and lost to the rest of the community'. *Towards a Unified eLearning Strategy*. Diane Laurillard looks principally to teachers for innovation, underestimating the effort and technical expertise required to develop transferable resources. It is industry, working in close collaboration with the profession, which must take the lead.

<sup>2</sup> 'The innovator has for enemies all who have done well under the old, and lukewarm defenders in those who may do well under the new law.' *The Prince, Niccolo Machiavelli*.

<sup>3</sup> Becta; JISC; eGU; NCSL; CEL; LF; TTA; SST; NESTA Futurelab; LSDA; LLUK; NIACE; e-Skills UK; Ufi; HEA; Ofsted; ALI; QAA; LSC; HEFCE; QCA; UKERNA; BSI; awarding bodies; advisory, admissions and information services; broadcasting and media organisations; Children's Workforce Development Council; digital content industry groups; education publication industry groups; employer organisations; ICT infrastructure industry groups; local authorities, directors of children's services and local education authorities; library and information science groups, other government departments and agencies with e-programmes; partners contracted to the Department for the delivery of National Strategies; trades unions and professional associations; regional bodies linked to the Department; research councils; subject associations, university research groups with a focus on e-learning and related disciplines; voluntary and community organisations; as well as others 'far too numerous to list'. *Harnessing Technology, page 65*.

'aggregated purchasing' has seen budgets return to centralised agencies. Public sector bodies are inevitably risk-averse, and risk is an inevitable partner to innovation. One symptom of this is the frequent requirement of public sector bodies for policy to be 'evidence based'. Although applied inconsistently<sup>4</sup>, this principle is always hostile to innovation, which, seeking to introduce new technologies, can never be justified by empirical evidence based on existing practice.

- There appear to be very few people with technical backgrounds working in senior positions in the DfES, Becta or the RBCs. XML documents are dismissed as being too technical to discuss even on technical working groups. Without a concrete understanding of the technologies involved, officials express themselves in a platitudinous and abstract language which is vague, reflects the assumptions lying behind the status quo, and can be interpreted to mean almost anything<sup>5</sup>. Technical advisers with genuine knowledge of e-learning standards appear to have little or no input into policy formation; other advisers are employed at short notice who have very little understanding of the area<sup>6</sup>; where officials are aware of their lack of technical understanding, they rely for advice on organisations which they perceive to be expert but which are just as likely to be acting out of self-interest<sup>7</sup>.

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<sup>4</sup> i.e. only when it is convenient. The prominent recommendation for ePortfolios, which emerged out of *Harnessing Technology* is based on no evidence of successful implementation of ePortfolios in the school sector. Similarly, when responding to the unfavourable evidence produced by the ImpaCT2 report, Doug Brown, in a keynote speech at BETT, responded that the pursuit of eLearning in schools was based, not on evidence, but intuition.

<sup>5</sup> 'Personalised (not individualised) learning space'; 'curriculum entitlement'; 'transforming teaching, learning and child development' through an 'integrated online information service' and 'a collaborative approach to personalised learning activities'. (All from a Becta presentation to the Learning Services Technical Sub Group, October 2005). Much of this language is pure gobbledegook.

<sup>6</sup> Becta's Best Practice Guide to Content Packaging was written at very short notice by a technical writer who clearly had no understanding of content packaging. So dissatisfied were industry partners with the quality of the draft that the project had to be transferred to a new consultancy for completion, a couple of weeks before its launch at BETT 2005.

<sup>7</sup> Four examples should suffice: (i) Becta's new strategy announced in 2004 relies partly on establishing consultancy links with 'industry partners'. As these partners are the same companies as are bidding in procurement processes run by Becta, their advice is not disinterested. (ii) As an independent content publisher, Harcourt's request to be represented on the Learning Platform Stakeholder Group in autumn 2003 was refused on the grounds that the big VLE providers also had experience as content publishers. The particular interests of independent publishers were explicitly excluded from the group. (iii) The LPSC's request for a data model to be developed to allow student grouping information to be transferred from MIS to VLE was ignored by the DfES on the grounds that the LEAs had not asked for this functionality. The LEAs clearly have no expertise in Learning Platforms. See *2.2.1.7 Learning Platforms Stakeholders Group*. (iv) Officials in the London Grid for Learning (LGfL) are happy to admit that they have a close working relationship with Becta. The LGfL was prominent in pushing the Shibboleth proposal, running what was said to be a successful pilot even though it involved no third-party VLE providers or content publishers. Becta's project plan for the procurement of Learning Platforms show that LGfL are also closely involved in this selection process. As LGfL has a 10% equity stake in DigitalBrain, a prominent VLE, its advisory position involves a clear conflict of interests.

## 2.2. The government's e-learning strategy

### 2.2.1. Recurrent failure of implementation

#### 2.2.1.1. National Grid for Learning

In 1997, the government launched its programme to improve learning in schools by announcing the National Grid for Learning, which was focused on improving hardware and connecting schools to the internet. David Blunkett made public statements to the effect that, once schools were connected to the internet, they would have access to an almost unlimited supply of learning content. It was obvious at the time that this content did not exist and it was predictable that the investment in connectivity would not result in significant gains in learning.

#### 2.2.1.2. Focus on internet research

Some educationalists welcomed the lack of content. They saw content-driven teaching as transmissive and authoritarian and saw in the internet an opportunity to develop habits of independent learning in which children would conduct their own research and learn to approach online sources of information critically. So far this approach has produced little more than widespread plagiarism. Ofsted has been consistently critical of internet research as a teaching pedagogy<sup>8</sup>.

#### 2.2.1.3. Focus on teacher training

Some officials blamed the lack of productive use being made of computers for learning on poor teacher skills. £230 million was allocated to a teacher training programme, although no-one knew exactly what teachers were being trained to do. Predictably, they were trained to do very little. Becta quoted with approval a teacher who boasted that she had learnt to send emails to her friends and to participate in online discussion forums. Ofsted was less impressed<sup>9</sup>.

#### 2.2.1.4. Curriculum Online and eLCs

When Charles Clarke became Secretary of State in 2002, he recognized the lack of learning content and planned to address this by funding eLCs and by approving the BBC's Digital Curriculum. It was

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<sup>8</sup> "Pupils do not have suitable strategies for efficiently and selectively searching the data available. Sometimes the content of a site is not fully explored and understood before they move on to another that appears on the surface to be more interesting. For too many pupils, the location of information remains an end in itself, and they present information unprocessed. In order to progress, pupils require much more sensitivity, determination and understanding to handle large volumes of potentially relevant information, as well as strategies for focusing on the most useful material for the purpose in hand. Too often the use of ICT involves unnecessary extra work or unproductive waiting." *ICT in schools, 2001. Ofsted.*

<sup>9</sup> Teachers became resistant to training that was inappropriate to their needs. Much training made a limited contribution to their awareness of subject-specific ICT applications and did not encourage them to consider pedagogical issues of teaching and learning with ICT.' *ICT in Schools, 2004, Ofsted.*

hoped that both initiatives would not only increase the quantity of learning content, but also improve its quality. I wrote to him suggesting that what was really required was a strategy for interoperable LMSs which would support the production and deployment of interactive learning content. I was invited onto Curriculum Online's Technical Working Group, but although a report on Content Packaging was commissioned from Simulacra in the Spring of 2003, the report was shelved and the working group was never given an opportunity to discuss its findings. The Content Advisory Board's third report admits that the eLC funding has had little impact on improving the quality of learning content<sup>10</sup>.

#### 2.2.1.5. BBC's Digital Curriculum

The BBC's Digital Curriculum provided a promising opportunity to break the content-platform impasse by producing a body of content, supporting standards for interoperability, which needed to be managed by third party platforms. The conditions imposed by the DCMS on the Digital Curriculum insisted that 'The BBC will work closely with the Curriculum Online Content Advisory Board and, where possible, follow its recommendations', effectively giving the CAB the right to instruct the BBC to support appropriate standards for interoperability. I wrote to Owen Lynch, urging him to ensure that the BBC's content was properly interoperable and was assured that the CAB took this issue seriously. But nothing was done and in December 2005, the CAB's Third Report bemoaned the fact that most of the BBC's content was unlikely to run on current learning platforms. The subsequent recommendation that the BBC should be allowed to develop its own management system showed political naivety, an unhealthily close relationship to the BBC, and Becta's instinctive preference for centralised, public-sector solutions.

#### 2.2.1.6. ImpaCT2 Report

The 2002 ImpaCT2 report looked for measurable gains in national test results from the use of ICT and found precious few which were statistically significant<sup>11</sup>. It is no wonder that both the press and the teaching profession are increasingly sceptical about the supposed benefits of e-learning. As the Guardian commented, 'Becta has a vested interest in plugging ICT, yet its report ImpaCT2, on the influence of ICT on pupil learning and attainment, was able to make only the most slender of correlations between ICT and results'<sup>12</sup>.

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<sup>10</sup> 'Although eLCs may have had a significant impact on promoting awareness and use of digital content in the classroom, they have probably not led to a step change in the level of innovation embodied in digital content used in the classroom.' *Third Report of the Content Advisory Board, December 2005*.

<sup>11</sup> The only statistically significant gains from high ICT use were 0.16 of a National Curriculum level in English at KS2, 0.214 of a NC level for Science at KS3, 0.56 and 0.41 of a grade respectively for Science and DT at GCSE.

<sup>12</sup> 'Cook the books', The Guardian, 12<sup>th</sup> April 2005.

Responding to the initial publication of the ImpaCT2 report in a keynote address at BETT2003, Doug Brown, PUS at the DfES, admitted that the empirical evidence in favour of e-learning was still thin but confirmed the government's support for e-learning in schools on the basis of an intuitive judgment. Doug Brown's intuition is good: what is a fault is a record of consistently poor implementation for which Becta has been primarily responsible.

#### 2.2.1.7. Learning Platforms Stakeholders Group

The Learning Platform Stakeholders Group (LPSG) was set up in the autumn of 2003, partly in response to my lobbying on Curriculum Online's Technical Standards Working Group during the first part of that year. The first meeting of the group called for Becta and the DfES urgently to address the requirement for a data model to allow grouping data to be passed between MIS and VLEs. When no action was taken, I submitted a proposal for such a data model in April 2004<sup>13</sup> and continued to chase until November 2004, when I was told that nothing was being done because it did not come under anyone's remit and the LEAs had not requested the functionality<sup>14</sup>. No-one in Becta or the DfES appears to have considered the possibility that requirements might emerge from industry working groups.

The LPSG did develop the potentially useful Learning Platform Conformance Regime which was said to have been launched at BETT 2005, although there was neither any literature nor anyone who had heard of the regime to be found on Becta's stand; nor was there any funding or conformance testing associated with the document. There was one further meeting of the group, in March 2005, after which it was allowed to lapse. The LPSG lasted for eighteen months and achieved nothing.

#### 2.2.1.8. Learning lessons from the record of implementation

In view of this consistently poor record, it is time that Becta recognised that innovation will emerge from a market in which the front-line teacher is the purchaser, and will not be driven, top-down, by bureaucrats with inadequate technical expertise.

### 2.2.2. Why LMSs are critical to e-learning

LMSs provide infrastructure which support the deployment of learning content. Ultimately, the LMS is important because content is important.

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<sup>13</sup> See Appendix B for a suggested architecture.

<sup>14</sup> 'On the issue of interoperability with MIS, we are following up with Simon Grigor and the IMS team and I understand Becta is prioritising this issue. However, it does not seem to be a quick one to fix, given that the IMS team in DfES does not mandate collection of data on class groupings and therefore does not have a formal need for this field. They point out that when they consulted with schools and LEAs this was not a field that was requested'. *Email from Steve Hogger of the DfES, November 2004.*

### 2.2.2.1. Content is king...<sup>15</sup>

The importance of learning content is a matter of dispute. It is frequently objected:

- that content generally assumes an outmoded model of learning, often described pejoratively as transmissive, instructionalist or behaviourist. People who voice this objection generally prefer to use the computer as a communications tool (using, for example, discussion forums) or a productivity tool (for example, allowing the student to create a multimedia presentation) or publishing tool (e.g. using the internet as a showcase for good work);
- that commercial content is inflexible and is therefore likely to be irrelevant to the particular programme of study or style of teaching being used in the classroom. For this reason, teachers often prefer content they have authored themselves.

The first objection mistakes what content *could be* for what content generally *is*. It assumes a narrow definition<sup>16</sup> of content either as expositive material which presents information for the student to absorb; or as mechanical assessments. Both of these formats may be useful and between them certainly account for the great majority of content currently available. In the context of LMSs, however, 'content' has a much wider definition, including moderated discussion forums, collaborative games, the use of productivity tools to achieve particular tasks, materials designed to provide stimulus for open-ended or off-computer tasks. Any curriculum-specific material or activity is 'content'.

Magazines like the *TES Online* regularly feature innovative uses of the computer which have been pioneered by enthusiast teachers. This gives an upbeat impression of the state of e-learning in schools which is not reflected in mainstream reality. Innovative techniques, which often require skill and perseverance to implement, are rarely transferable from the enthusiast pioneer to the mainstream teacher. For this transfer to occur, the experimental concept must be encapsulated in a form which the inexpert, non-enthusiast can use easily 'out of the box'. This is what commercial companies do: they turn innovative concepts into useable commodities; in this case, into 'content'.

The second objection (that commercial content is often inflexible and irrelevant) demonstrates the need for teachers to be able to control the deployment of content. Large, monolithic commercial products tend to lock the student in and lock the teacher out: the Integrated Learning

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<sup>15</sup> Bill Gates' 1996 seminal article of this title is at <http://www.microsoft.com/billgates/columns/1996essay/essay960103.asp>).

<sup>16</sup> 'When it comes to an interactive network such as the Internet, the definition of "content" becomes very wide'. Bill Gates, *ibid*.

Systems of the 1990s were notorious in this regard. Teachers must be able to

- *select* the precise task that they wish their students to complete,
- *adapt* the task to fit the particular circumstances in which it is being deployed,
- *combine* the task in a course which combines many different kinds of activity from many different sources, both commercial and self-produced,
- *track* student activity so that the teacher can plan progression and integrate digital and conventional programmes of study.

This is exactly what the LMS does: it puts the teacher in control of digital learning content. Without this deployment infrastructure, without allowing the teacher to manage content, content is largely irrelevant to classroom practice.

The exception which proves this rule is the recent progress made with whiteboards, which has stimulated a market for expositive resources. Whiteboards have provided the hardware infrastructure for whole-class teaching. The LMS provides an equivalent software infrastructure for the deployment of content for individual and small group learning.

#### 2.2.2.2. ...or content would be king

If content has not yet secured its throne, it is because too much is still of low quality. For all the potential of the computer to deliver the rich interactivity which is particularly appropriate to learning, most content is still highly expositive. E-learning Credits, which the DfES hoped would help, have increased prices rather than quality<sup>17</sup>.

Where eLCs have failed, LMSs will help:

- A significant barrier to the development of highly interactive content is their need for back-end database systems to manage performance, state, preference, authorization and initialization data. Many larger publishers have been developing their own proprietary management systems. These represent a significant overhead and are not viable in the long term, as schools do not want to run a multiplicity of management systems.

The early introduction of LMSs will remove the overhead of having to develop back-end database systems, making it easier for smaller publishers to produce richly interactive content.

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<sup>17</sup> 'eLCs...have probably not led to a step change in the level of innovation embodied in digital content used in the classroom'. *Third Report of the Content Advisory Board to the Secretary of State, December 2005*.

- The fact that LMSs support features such as tracking of performance and the management of competency, bookmarking, preference and initialization data, not only makes it easier for publishers to provide advanced functionality, but encourages teachers to require it.
- To be viable in the classroom, content has to provide a reasonably wide coverage. This can make it difficult for small publishers or experimental products to become established in the market.  
The ability of LMSs to combine learning objects from different sources into an integrated programme of study lowers the threshold of entry to small publishers and innovative products.
- The ability to combine products also makes it possible for teachers to 'pick and mix' content, increasing discrimination and consequently the power of the market to drive up standards.
- The principle benefit of LMSs is that, in providing a common deployment infrastructure for learning content, they ensure that successful content is used. This in itself is a powerful motor for innovation.

## 2.3. Interoperability

### 2.3.1. Interoperability of data and of programs

There could be said to be two kinds of interoperability: interoperability of data and of programs. An example of data interoperability is the ability of Microsoft Word to load a file produced by WordPerfect. An example of program interoperability is the ability to create a new email in Microsoft Outlook, automatically using Microsoft Word as the editor; or the integration of anti-virus software with the email program. Program interoperability requires more than data interoperability: as well as understanding each other's data formats, the two programs must be able to find each other or one must be able to launch each other, and there must be a transport mechanism, allowing the data to be passed automatically, without intervention from the user.

In the concern for 'joined up government', public sector organisations are particularly concerned with interoperability of data. The e-GIF initiative is primarily designed to ensure that data can flow seamlessly between different government departments and agencies. It is natural that public sector officials often understand interoperability from the perspective of e-GIF and may find it difficult to appreciate the particular importance of program interoperability for learning platforms.

Diane Laurillard states that the ‘interoperability problem’ is about ‘resources that work in one place but not in another’<sup>18</sup>. This demonstrates the characteristic misunderstanding of the problem. Interoperability is not just about squirting content onto other people’s websites: it is about decoupling content from infrastructure in a way which completely changes the design paradigm; it is like being able to sell a toaster which no longer has to come with its own internal power generator, but which instead can plug into the mains; it is about creating an architecture to support the creation of advanced content, delivering interactive and collaborative pedagogies, which can be deployed realistically in the classroom, and which integrates with the school’s management information systems.

### 2.3.2. Plug-and-play

Most LMSs used for adult training are deployed in a controlled environment, where one supplier either develops the content for a specific LMS or is at least able to integrate content and LMS, normally on the same server. The schools sector inevitably has a more complex, market driven model, in which there are many competing LMS suppliers and each LMS must manage content from a many different publishers, possibly running on different domains.

Most current VLEs in the schools sector offer access by subscription to a predetermined collection of content. The content repository model, like the LMS used in adult training, provides a controlled environment which allows the LMS provider to ‘tweak’ content interoperability and resolve any compatibility issues.

Although easier to implement, the content repository model has several disadvantages:

1. Ambiguities in the standards are likely to be resolved differently by different VLEs, leading to a divergence in implementations. Content publishers are likely to have to produce subtly different packages for different systems, increasing cost and discouraging them from supporting the learning object model.
2. Schools will be restricted in the range of content which they can use with their chosen learning platform.
3. Providers of successful learning platforms will achieve a stranglehold on the market as publishers will increasingly be forced to accept terms dictated to them by the platform providers.

These very significant disadvantages of the closed system can be avoided by ensuring that schools can register any compliant content onto their chosen platform. To achieve this, it is important that the integration of content and LMS is (a) easily achieved, and (b) robust.

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<sup>18</sup> Towards a Unified eLearning Strategy, paragraph 105.

Plug-and-play integration can only be assured if there is a public authority which is responsible for ensuring, not only that particular products meet required standards, but that the standards themselves are unambiguous and work smoothly. Achieving this will require a continuous process of testing and review and an agency which is technically competent and able to respond rapidly to issues as they arise.

### **2.3.3. Types of LMS interoperability**

LMSs could be seen as occupying a space between Management Information Systems (MIS) and learning content. While any one school would want a single MIS and a single LMS, it would want to be able to use a wide range of learning content. The relationship between MIS and LMS is therefore a one-to-one relationship; while the relationship between LMS and learning content will be a one-to-many relationship.

#### **2.3.3.1. Importing student records**

In order to track student activity, the LMS needs to know the identity of all the students who are accessing the system. While it does not need extensive demographic data, it does need detailed grouping information (for example, the student's year-group, the subjects being studied and membership of teaching sets). It would not only be tedious for the school to have to re-enter this information into the LMS when it was already held by MIS but would also lead to errors as duplicated data fell out of date.

The generally recognised standard for MIS-LMS interoperability is IMS Enterprise, which allows demographic and grouping information about students to be exchanged. To pass the critical grouping information, however, IMS Enterprise lacks a vocabulary of acceptable group types and how the different group types relate to each other. This vocabulary has to be developed by local communities. Groups exist within a hierarchy. For example, level 1 groups might be year-groups, level 2 might be teaching sets; in which case each level 2 group would be a child of one of the level 1 groups, as '3B' is a child of 'Y3'. A suggested model for a grouping hierarchy, sent to the LPSG in April 2004, is attached as Appendix A.

Without a data model representing the appropriate groups, their levels in their hierarchy and their relationships, IMS Enterprise cannot be used to transfer grouping information.

While MIS-LMS interoperability is essentially a question of data interoperability, it would be tedious and unreliable to rely on operators in the school manually to import data from one system to the other. It is highly desirable that any changes to student records in the MIS should be reflected immediately in the LMS. This requires the definition of a mechanism which would allow student records to be passed automatically from MIS to LMS, the most obvious solution being a web-service. A set of standard calls to insert, edit and delete student records would be defined. The web service would be

implemented by compliant LMSs and could be registered onto compliant MISs. The MIS could then call the appropriate web service to 'push' changes up to the LMS.

#### 2.3.3.2. Managing content

As well as controlling the student's access to particular learning objects, the principle benefits of the LMS lies in its ability to communicate with a learning object as it runs. This allows the LMS to:

- Record student performance data
- Manage communication from within a learning object
- Manage bookmarking data
- Manage appropriate competency data
- Manage student preference data
- Manage authorisation keys (DRM)
- Manage initialization data

The provision of these back-end data services, which are critical for the development of advanced learning objects, are handled for web-content by the SCORM run-time protocol. Although it has been used extensively for integrated systems installed mainly for adult training, where LMS and content are both provided by the same supplier, it has not been used in a plug-and-play environment. It is therefore likely that a continuing programme of piloting and technical guidance may be needed to resolve any ambiguities in the specifications that emerge as publishers start to develop SCORM-compliant learning objects.

Due to the tightening of security in modern browsers, there is a particular technical difficulty in using SCORM run-time when the LMS resides on a different web domain to the content. While there are a number of technical solutions to this difficulty, it remains to be seen how reliably these can be resolved in a plug-and-play environment.

#### 2.3.3.3. Learning objects, SCOs and SCAs

The learning object model is based on the notion that content should be disaggregated (or broken apart) into discrete atoms. In practice, each object would probably consist of a web-page, possibly with sub-pages.

Learning objects do not have to be of any particular size: a single object could in theory comprise hundreds of pages; but the presumption is that they should be fairly small. Learning objects are pedagogically neutral: an object might be a PowerPoint presentation, a discussion forum, an assessment, a game, or instructions for an experiment in the laboratory.

The benefit of the learning object model is that, instead of being locked into monolithic products, it allows teachers to access content at low granularity, choosing the particular objects which suit their programmes of study and their teaching style. Each object, having no dependency on any other, can in theory be reused in different

contexts or presented in a different combinations. The best objects will be reused more often, creating a more flexible market and encouraging innovation.

Under the SCORM protocol, there are two kinds of learning object (although only one is dignified with the epithet 'object'): a Shareable Content Object (SCO) is an object which supports the SCORM run-time; while a Shareable Content Asset (SCA) is an object which does not support the SCORM run-time. This paper will refer to SCOs as 'interoperable objects' and SCAs as 'passive objects'.

Learning objects and Learning Management Systems are interdependent. Learning Objects require a managed environment to support their effective deployment.

#### 2.3.3.4. Importing content

Before launching or managing any learning content, the LMS must first know at the very least of its existence. This is achieved by registering the content onto the LMS. Metadata describing the content is transferred as a manifest file, the structure of which is specified by one of two protocols: the IMS Content Packaging standard is sufficient to describe traditional content; this standard is extended by the SCORM Content Aggregation Model (CAM) to carry the extra information required to run content which supports the SCORM run-time.

There is little difficulty when content packaging is used to provide a simple list of resources. What is more challenging is providing a structure so that resources are presented to the student in a particular order or depending on a particular set of conditions. It is unclear whether SCORM's Simple Sequencing protocol is sufficiently clear, powerful or robust for use in a plug-and-play environment. At the very least, there will be a need for piloting and possibly for the definition of a simplified subset of Simple Sequencing or the development of an alternative approach.

The SCORM CAM may also need further development if it is to meet the needs of commercial plug-and-play. At the moment, only very limited copyright information can be transferred. Commercial publishers are unlikely to have full confidence in the learning object model unless their objects can be branded and their DRM properly controlled. Schools are also likely to demand learning objects which support collaborative exercises as well as individual study.

Some publishers are also concerned about the extent to which their content may be disaggregated (i.e. broken apart). While allowing teachers and students to access individual learning objects is likely to increase usage, there may come a point where excessive disaggregation may undermine the integrity of the content. The BBC is developing rules for the use of its content packages by VLEs which will restrict the extent of the disaggregation allowed. There is a need to establish industry-wide rules in this area.

Simple implementations of content packaging standards are beginning to be used extensively to transfer content onto Virtual Learning Environments. This may open up new routes to market for content publishers, but it brings little or no benefit to the end-user. It is the SCORM run-time which supports the advanced content which makes a difference to learning. The importance of content packaging lies in its use to distribute interoperable learning objects.

#### 2.3.3.5. Other requirements for interoperability

There are several other possible requirements for interoperability involving LMSs, for example:

- Exporting student performance and competency data to MIS, target tracking and report writing systems.
- Exporting example of student work or other evidence of competency to e-portfolio systems.
- Exporting student coursework to exam boards.
- Allowing teachers to search content catalogues, such as Curriculum Online's portal.
- Developing more sophisticated and robust standards for sequencing.
- Allowing different types of learning platform to share a common authentication and authorisation procedure.

These requirements may offer significant benefits but they represent neither necessary pre-requisites nor are they essential to the functioning of LMSs (see *2.3.4 Importance of interoperability* below). Some of them will require major input from teachers and educationalists and cannot be developed by the technical community alone. These are secondary priorities and should not be allowed to delay completion of work on higher priorities.

### 2.3.4. Importance of interoperability

#### 2.3.4.1. Decoupling content and infrastructure

An LMS which cannot interoperate with a learning object is not an LMS. Content interoperability, (which Becta facetly dismisses as 'nebulous and complex'<sup>19</sup>) is essential to the existence of the LMS. See *2.2.2 Why LMSs are critical*.

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<sup>19</sup> Presentation to the Learning Services Technical Sub Group, November 2005.

#### 2.3.4.2. Capturing and disseminating data

Supermarkets were revolutionised by the bar-code reader, which fed information from the point of sale straight into store management systems. Similarly, LMSs have the potential to capture performance and competency data and passing this data on to Senior Management Teams, Special Needs Teams, LEAs, parents, and anyone else who has a legitimate interest.

More mundanely, LMSs require data about students and which groups they belong to. Without MIS-VLE interoperability, this information must be keyed in twice, leading to a waste of time and money, and to errors caused by duplicated data. Without the ability to import student records, it is unlikely that schools will regard LMSs as viable.

#### 2.3.4.3. Ensuring a vibrant, flexible and fair market

Without robust standards for interoperability, data exchange can only be achieved by using proprietary protocols. These give an anti-competitive advantage to the company which controls the protocol. Teachers find themselves locked into inferior systems and small, innovative companies find themselves marginalised.

In its reply to the European Educational Partnership (see *3.1 Background to the procurement* below), the DfES stressed the importance in its procurement strategy of the “Integrated Service Provider”, i.e. the body who sorts out, aggregates and supplies...what the...purchasing body needs’. Under this model, the DfES proposes to set up a series of parallel commercial fiefdoms, reducing market flexibility and stifling innovation.

## 3. Becta’s procurement strategy

### 3.1. Background to the procurement

In November 2005, the DfES announced a programme to introduce by 2008 learning platforms providing personalised online learning space with the potential to support e-portfolios. Becta was asked to provide a framework to support procurement by March 2006.

Becta posted a first draft of its requirements document at the end of January 2006, setting a deadline for the finalisation of this document by March 27<sup>th</sup>, while promising a set of technical specifications by mid April. An OJEU notice was published on 28<sup>th</sup> February with a deadline for responses at 12 noon on 30<sup>th</sup> March.

The requirements document included an extensive yet poorly defined list of functions, making it clear that the forthcoming procurement process would require all mandatory functions to be met by a single tender.

This document was given a hostile reception on the Learning Services Technical Sub Group, while the prospect of a centralised procurement exercise was roundly condemned by the Times Educational Supplement<sup>20</sup>. In February and April the European Education Partnership (EEP) held an industry conference to discuss the widespread perception that Becta's procurement exercise would damage the market for learning platforms, impose inappropriate systems on schools, restrict competition and hinder innovation<sup>21</sup>.

The final draft of the requirements document was posted at 4.30 p.m. on 30<sup>th</sup> March, three days late and four hours *after* the closing time for responses to the OJEU notice. Moreover, the requirements document was incomplete, lacking the technical specifications. This was promised by mid-April but the first and hopefully named 'final draft' was full of inconsistencies and this document has still not been signed off in mid June.

Becta's procurement strategy is ill conceived, has been hurriedly drafted, is full of inconsistencies, will severely damage the development of a market for useful learning platforms and has aroused universal condemnation. It should be cancelled immediately.

## 3.2. Why the procurement is mistaken

### 3.2.1. Failure to provide for interoperability

Interoperability is an essential prerequisite to LMSs (see 2.3.4 *Importance of interoperability*). Robust, 'plug-and-play' interoperability can only be ensured if supervised by an independent body, which in the case of schools, would almost certainly be Becta. By providing specifications for learning platforms without first providing the necessary infrastructure to ensure effective interoperability, Becta is encouraging the introduction of proprietary systems which will seriously damage the emergence of a free, fair and innovative market.

#### 3.2.1.1. Inadequate standards for transfer of student records

The ability of learning platforms to load student grouping data from MIS systems using the IMS Enterprise protocol requires the provision of a data model (see 2.3.3.1 *Importing student records*) and, ideally, specifications for a web service to allow data to be transferred transparently. These data models were requested by the Learning Platform Stakeholder Group in the autumn of 2003 but the DfES and Becta have failed, either to respond to this request, or to give a coherent reason why the request was unnecessary.

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<sup>20</sup> TES Online Magazine, 8<sup>th</sup> March 2006.

<sup>21</sup> 'The outcome of this meeting was the strong and unanimous view that successful use of LPs, and effective return on the government's and schools' investments of money and time, are only likely to happen if schools are enabled to choose learning platforms to fit their individual needs and if the commercial sector is enabled to respond to this as a competitive market, with competition driving innovation'. *Summary of EEP meeting in February 2006*.

#### 3.2.1.2. Ignores need for interoperable content

Public sector officials appear to have consistently misunderstood the vital importance of runtime content interoperability (see *2.2.2 Why LMSs are critical*). There is much talk about interoperable platforms but nothing has been done to promote the production or identification of interoperable content, when it is perfectly clear that the former are useless without the latter.

#### 3.2.1.3. Failure to ensure interoperability with Jam content

A significant opportunity to pump-prime the production of interoperable learning objects has been presented by the BBC's Digital Curriculum. It is now discovered that much of the BBC's Jam content is not compatible with leading VLEs. This is entirely Becta's fault (see *2.2.1.5 BBC's Digital Curriculum*).

#### 3.2.1.4. Inadequacy of technical specifications

Becta's technical specifications do not prevent the development of proprietary systems which lock customers in:

- Specifications R27 and R28 for import and export of student records provide only *recommended* standards. This is like introducing a standard for electrical plugs & sockets in which each provider can choose what size and shape pins to use.
- There are some places where proprietary links should be positively prohibited to avoid proprietary lock-in. An example is the bundling of proprietary authoring tools. Schools may commit thousands of man-hours of work to developing resources, which they find they can only use with one system.

#### 3.2.1.5. Failure to provide guidance and resolution service

As discussed in *2.3.3.2 Managing content*, the SCORM run-time is not sufficiently robust to be used in a plug-and-play environment without a public authority to provide clarification of the standard and resolve ambiguities as they arise. Becta has neither the will<sup>22</sup> nor in all probability the technical competence to provide this essential service.

### 3.2.2. Prescriptive pedagogy

While Becta has balked at establishing a framework for interoperability, it has been keen to specify exactly what learning platforms should do. Although schools and LEAs are not compelled to pay any attention to Becta's recommendations, these are likely to have considerable influence.

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<sup>22</sup> A presentation to the Learning Services Technical Sub Group suggested that a modular approach 'could be very resource intensive and would require careful management'. There is nothing so resource intensive as a rigged market.

#### 3.2.2.1. Breaks assurance to reduce prescription

The White Paper, *14-19 Education and Skills*, presented in February 2005, gave the assurance that the DfES would reduce prescription in the curriculum. It does not appear to be consistent with this objective that Becta should be seeking dramatically to increase prescription in the procurement of learning platforms.

#### 3.2.2.2. Poor record in ICT of prescriptive solutions

Becta's poor record over the last eight years in implementing e-learning in schools (see *2.2.1 Recurrent failure of implementation*) and the lack of innovation that follows in such a centralised environment do not suggest that this is an appropriate solution, especially for an immature technology like learning platforms.

#### 3.2.2.3. Inadequacy of the evidence base

Becta officials admit that they are unsure about the requirements which they are publishing<sup>23</sup>. The fact that there are no advanced LMSs currently deployed in schools means that the choice of requirements cannot be justified by any evidence base. In this situation, Becta should be proceeding cautiously by encouraging diversity and experimentation. They are doing the opposite.

#### 3.2.2.4. Patronising teachers

At the best of times, teachers do not like being told by bureaucrats how to teach. Becta is being particularly naïve because:

- They have no evidence base to support their dictates
- Learning platforms are particularly contentious, arousing fierce debates between constructivists and instructionalists (see *2.1.2.3 Opposition to content driven systems.*). Becta is placing itself in the firing line of this ideological battle.
- As DfES observes, the real challenge for e-learning lies in cultural and institutional change. Institutional change, however, is not a prerequisite for successful technology: it is its consequence. Conversely, the DfES is mistaken if it thinks it can drive through institutional change on the back of unproven technology.

#### 3.2.2.5. Unrealistic expectations

Becta has responded to the ideological battle by adding a large number of recommendations to its requirements documents, from authoring tools, including those for 'wiki' knowledge systems, to e-

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<sup>23</sup> 'When you say that we are saying 'We are not quite sure what we want, but we think it is something along these lines - what can you come up with?' - you are partly right'. Post to the Learning Services Technical Sub Group by Peter Jackson, 9<sup>th</sup> March 2006.

portfolios, assessment and sequencing; suggesting that all these functions should be provided by the same 'integrated service provider'. It is highly unlikely that it will be possible for all these functions to be provided by one supplier in the very short timescales allowed.

It is possible that that Becta might respond to this situation by commissioning systems which do not meet all their mandatory requirements but which might be extended to do so. As well as exacerbating all the problems associated with prescriptive solutions, such an approach would demonstrate extreme bad faith on Becta's part, considering that it is small innovative companies like Alpha Learning which have played a considerable part in building the requirements document. Becta's working groups would lose all credibility, having acted as a forum for technology transfer from small innovative companies to large uninnovative companies which happen fit in with Becta's model of centralised procurement.

### **3.2.3. Inhibiting innovation**

#### **3.2.3.1. Locking out small suppliers**

It is often small companies which pioneer innovative new technologies.

Small suppliers are explicitly locked out of Becta's procurement strategy by the insistence that to tender, suppliers must have a D&B positive net worth of £700,000 to £1,499,999. While it is understandable that smaller companies could not be expected to tender for large infrastructure projects, the procurement will disrupt the ability of small companies to prove their products on a smaller scale.

Smaller companies are prevented from supplying direct to the market by insisting that they work through an 'integrated service provider', who must cover all of Becta's mandatory requirements.

#### **3.2.3.2. Reducing flexibility**

A company successfully tendering under Becta's procurement will be given preferred status for four years. Although Becta promises frequent updates to their requirements document, it is difficult to see how these updates could be enforceable. The procurement will freeze development of public standards for four years.

## **3.3. An alternative**

This paper has necessarily been negative and critical. I would be very happy to contribute constructively to developing a better strategy for the introduction of learning platforms to schools, if Becta were prepared to cancel its procurement and reconsider the way forward. This section seeks only to sketch in rough outline what the main pillars of such a strategy might be.

### **3.3.1. Principles**

#### 3.3.1.1. Pedagogic neutrality

As a technical agency, it is Becta's task to support the means to achieve what the profession considers useful, not to dictate what pedagogies should be used.

#### 3.3.1.2. Innovation will emerge from the market

Innovation is best served by creating efficient markets, not by directing developments from the centre.

### **3.3.2. Action required**

#### 3.3.2.1. Establish a framework for interoperability

Robust, plug-and-play interoperability supports a modular architecture. Each component can compete against similar products on the basis of quality, rather than on alliances manipulated by powerful interest groups.

Becta should:

- Provide data models as required.
- Provide a conformance testing service.
- Provide a technical service to advise on the implementation of technical standards and to resolve ambiguities as they emerge.
- Engage in the development of existing and new standards to meet the needs of British schools.
- Manage a programme of pilots to prove initially the technical effectiveness of standards.

#### 3.3.2.2. Prioritize and timetable

A complete and robust framework will be the work of several years. Becta must prioritize the introduction of different standards and produce a realistic timetable for their introduction. This timetable should give commercial companies plenty of warning of the introduction of new standards.

#### 3.3.2.3. Create an architecture

The timetable should be driven by a clear architecture which demonstrates clearly what is the purpose of each component. A suggested architecture is attached in Appendix B. This architecture may develop over time as lessons are learnt from its implementation. Reviews of the architecture should be built into the timetable.

#### 3.3.2.4. Kite-marking

Products should be kite-marked to show that they fulfil particular roles within the architecture. Kite-marking should not indicate subjective judgements on quality or pedagogical approach: rather, it should simply require conformance to particular standards, chiefly for interoperability. Kite-marking would need to be supported by an effective communications strategy.

#### 3.3.2.5. Encourage effective reviewing

Subjective judgements on quality and pedagogy should be left to robust user reviews. At the moment, government websites carry only reviews by agencies commissioned by the publisher. Reviewers are explicitly forbidden from criticising the product. Consequently, reviews are banal and lack credibility. Portals such as Curriculum Online should imitate websites such as Amazon in allowing reviews by professional teachers and include devices such as star ratings to make reviews accessible and clear.

Crispin Weston  
Alpha Learning  
12<sup>th</sup> June 2006

# Appendix A

## Proposed model for grouping information

## Appendix B

### Proposed architecture for learning platforms