Learning technology standardization

Trying to acquaint oneself with the learning technology standardisation arena rapidly becomes a bewildering experience. Acronyms and organisations abound, a search for firm grounds on who decides what seems futile, and the gurus contradict each other. This short paper by Peter Sloep provides some secure footing by discussing the rationale behind the turmoil. For the end user needing to determine a course of action, there is some useful advice: Avoid the adoption of proprietary standards as, in the end, this may not only increase costs but also negatively affect the quality of education. Long term interests are better served - be it cautiously - by following existing specifications and, if at all possible, joining existing initiatives to influence the specification process.

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Standardization – in its broadest sense, agreeing on a particular set of features that a product or process should exhibit – has not been common practice for very long. Until the beginning of the nineteenth century, for instance, every machinist would thread individual nuts and bolts as required. This practice had the side-effect, perhaps unintended, that customers would have to call back for replacement nuts and bolts. Obviously, this was annoying for customers; at the very least, it was cumbersome not to be able to go to some other machinist who perhaps delivered a better or cheaper product. In the end – and there is obviously an interesting piece of history to tell here - machinists and their customers collectively came to agree on the way nuts and bolt could best be threaded. (In the UK, Joseph Whitworth introduced standard screw threads in 1841.) An important economic reason why such the agreement came about at all was that the industrial mass production of nuts and bolts could hardly get started without it. And, although there was no obligation of individual machinists to stick to the agreement, it rapidly became an openly accessible, publicly shared standard that every machinist had to comply with if they wanted to stay in business. (The example derives from Wired Magazine, January 2002.)

In a nutshell, this example sketches why standards are so useful. The customer can choose from a large offering, picking the cheapest product, or the best, or that combination that is the best compromise. Also, since producers compete with each other over the range of available products, prices will go down and quality will increase. Producers profits too. They get more opportunities for selling their product, as the potential market for has grown. So both customers and producers stand to profit from standardisation.

De *jure* standards, *de facto* specifications

Once this became clear to a sufficient number of people, particularly people in positions of influence, the standardization process became institutionalized. There is a lot to be said about the way standardization institutions operate. Suffice it to say that, typically, agreements – or better, specifications for standards – are developed in communities of interested experts. Such specifications may subsequently be submitted to official bodies for certification. Official certification bodies may be found at the national level (NEN, DIN, BSI, ANSI) and supranational level (CEN, IEEE, ISO). Strictly speaking, only after certification of a specification can one call it a true, i.e. *de jure*, standard. In some language - such as French, German, Dutch - *de jure* standards are called *norms*.

Although a producer profits from *de jure* standards, there is one particular situation that is even more preferable to the producer: a standard of their own making that nevertheless almost everybody adheres to. As the owner of such a *proprietary* (it is their intellectual property), *de facto* (everybody uses it) standard, the producer can prevent serious competition and, once the customers have a large vested interest in the standard, can have them pay almost any price. After all, customers will now base their decision to stick to the standard on the costs of exit, not on the costs and quality of alternatives.

An added benefit to the owner of the specification is that there is no longer a need to spend money on the time-consuming and costly processes of consensus building with competitors and customer groups. However, as much as the existence of proprietary *de facto* standards is a producer's heaven, it is a consumers' hell. Quality and price are – within the bounds of the burden a customer is prepared to carry - unilaterally determined by the producer. If the producer decides to change the standard, there is little a customer can do if a viable alternative is lacking. The upshot is that a sensible customer takes future developments into account and therefore always strives for *de jure* standards. The sensible customer even demands from the supplier that such standards are adhered to. Remember, this is what got the standardization of nuts and bolts going.

Keeping up with innovation

Over the last decade or so, it has become increasingly important to arrive quickly at standards, particularly in the area of computer technology. The pace of innovation there is murderous. Processor speeds, hard disk and RAM memory capacities, and bandwidths double every few years. Since it is only countries – not individuals or private companies - that can decide on *de jure* standards, and since these countries typically go through a careful but time-consuming certification process, the production of *de jure* standards cannot keep pace with the rate of innovation. That is why parallel to this domain specific circles of experts have sprung into

existence who, as a group with vested interests, try to arrive at a consensus. They cannot proclaim *de jure* standards, which is the prerogative of country delegates. However, as a consensus group, they may publish specifications that ultimately may become a certified standard.
Such specifications may for all practical purposes fulfil the role of a standard within the relevant community of practice. Since the specification is not owned by an individual but by a group, it is an open *de facto* standard. A sensible customer therefore strives for *de jure* standards, but, if they do not yet exist or take too long to come about, they strive for non-proprietary (i.e. open) *de facto* standards that may eventually become *de jure* standards. The W3C is a perfect example of a group of experts that operate in this fashion. Their specifications on, broadly speaking, the Internet are written by experts, and are *de facto* standards - but they are also open (anybody may inspect them) and free (anybody may use them).

Specifications for learning technologies

Computer technology is not the only field that advances quickly. In its wake, all sorts of novel applications of this technology emerge with similar speed. In about half a decade, the Internet has evolved from a gadget to almost a public utility that many of us could hardly do without. And even though the development of specifications for e-learning technologies has only seriously began around five years ago, its advances are marked. There are specifications for the exchange of student-related data between administrative (enterprise) systems, for the description of learning content in terms of metadata, for the exchange of learning content between digital or virtual learning environments, for the description of pedagogical scenarios, for the management of tests and questions, for the storage and retrieval of learning content in repositories, etc.

Important work is being done both in the official standardization bodies, populated by delegates from participating countries, and in circles of experts, who populate consortia, working groups, technical committees, etc. The IMS consortium is the best known example, world-wide, of the latter category. *De jure* standards do not exist yet, although at the time of writing (spring 2002) the Learning Object Metadata specification is firmly *en route* to becoming one; many specifications are available, although most of them are in draft form and therefore exhibit varying degrees of stability.

From the vantage point of an educational institution - be it a government-sponsored university, a commercial e-learning provider, or any other institution considering the adoption of e-learning – the question of what to do in such uncertain times looms large. Let the e-learning band wagon roll on for a while? To most institutions, this is a practical impossibility since students and trainees ask for both online and offline facilities; when other institutions offer such facilities, however shaky, waiting means loosing out in the competition for students. Hop on the market leader's band wagon and hope that they will survive the

inevitable shake out? If viable, this is a successful short term strategy. In the long term it leads to the emergence of proprietary *de facto* standards, something to be avoided. It will mean price increases, and perhaps quality decreases. It will most likely mean that there is little room for cultural divergence.

Education is imbued with cultural factors to such an extent that, for example, a uniform electronic learning environment, made to measure for the largest market, would seriously affect the quality of education in the other markets. (This is not a chimera, the American schoolbook market operates on these very principles. If Texas had indeed banned teaching on biological evolution as it planned to in the eighties, teaching evolution would effectively have been banned throughout the United States.)

So follow the standards trail then? The problem with this strategy is that, as I already mentioned, there are no standards yet, only specifications for standards that often are not really sufficiently stable. So there may not yet be any specification at all adopt, or it may unstable or incomplete to the extent that to adopt it now would be risky. So we are faced with a veritable predicament. In spite of the reservations, I feel that investing in standards is the only sensible thing to do, because in the long run only it will guarantee a mix of good quality products for reasonable prices. But how does one cope with short term needs?

Strategies for the short term

First of all, short term needs may be covered by the specifications and draft specifications that are available already. Cases in point are the Learning Object Metadata specification, which the IEEE is about to certify, and the IMS Content Packaging specification, which is being used and implemented to an increasing degree by, among others, the ADL initiative for SCORM. The IMS Learning Design group has adopted EML, which is already a fully-fledged operational specification, as the basis for its specification. To the extent that these specifications - and others not mentioned here - represent the current consensus, they already offer the user something concrete to work with while diminishing the risk of being locked in.

There remains a residual risk, the more so the less mature the specification used, of non-compliance with future versions of still immature specifications. As long as one does not adopt too early a version, this risk is manageable. For one thing, standardisation bodies take backward compatibility seriously, if only because the users of standards are represented in these bodies. Besides, because specifications usually are bound in XML, one may transform an older version to a newer one, at least in part. This significantly decreases the migration burden. A case in point is the Dublin Core metadata specification that for all practical purposes may be seen as a subset of the LOM, even though names of labels differ.

Secondly, for those needs that aren't covered by existing specifications or standards, one is forced to adopt proprietary solutions. In all likelihood, whoever feels compelled to do this belongs to the group of early adopters of new technologies. Taking risk is part and parcel of an early adopter strategy. However, if one wants to decrease the inherent risks one may want to actively participate in the standardisation process. Since the development and assessment of specifications is rather a specialized job, only fairly large groups have the resources to keep track of the standards development work, let alone contribute to it. It is therefore wise to join hands. Parties with shared interests divide the work and keep one another posted. The British *Centre for Educational Technology Interoperability Standards* (CETIS) provides an eminent example of such an approach. CETIS represents the combined interests of the higher and further education sector in the UK. Industry Canada is a slightly different example, although it operates on the same rationale. But also transnational interest groups may arise. An example of this is the recently established EML authoring and content management group (the 'Valkenburg Group').

In the final analysis, then, one should avoid the hasty adoption of proprietary standards. Ultimately, this may not only be costly but also affect the quality of education. To protect one's long term interests one had better become a cautious follower of existing specifications. Better still - join forces with like-minded people and influence the specification process.

URLs

ADL	www.adlnet.org
AICC	www.aicc.org
CEN/ISSS	www.cenorm.be/isss/Workshop/lt/
CETIS	www.cetis.ac.uk
DIN	www.din.de
IEEE	ltsc.ieee.org
IMS	www.imsproject.org
ISO	http://www.iso.ch
NEN/NNI	www.nen.nl