Position paper for CETIS conference

This paper reflects the general position of two allied organizations, SALTIS and LETSI. It was prepared jointly by a principal of each, but has not been formally endorsed by the respective memberships.

The importance of effective interoperability solutions

Effective interoperability often constitutes a necessary prerequisite for the operation of free markets.

The lack of such interoperability has been a significant contributory factor in the failure of attempts to use technology effectively to improve the quality of learning in the UK and elsewhere. The costs involved in transplanting a successful pilot project are often prohibitive and innovative new products often fail if they don't interoperate off the shelf with existing installed systems. Standard interfaces and data formats are required.

To the extent that these standards are adopted across national and market boundaries, they can expedite the rapid migration of innovative teaching methods. A simulation developed for preparing physicians for re-certification, for example, might be found useful as a high school biology lab.

As educational innovation is a matter of acute public interest, and significant cost savings are promised, there is a strong argument that government should support the creation of better standards. History has shown, however, that direct government supervision of the process is not often successful. Any funding should be provided at "arm's length" to support decision processes which include all interested stakeholders.

Avoidance of quality standards

Judgements of quality are normally subjective and may often become obsolete as technology progresses. The attempt to standardise what may be perceived as best practice is likely to entrench current orthodoxies and inhibit innovation. Quality is best achieved through competitive markets and not through standardisation.

Formal standardisation

Formal standardisation is a useful way of ensuring open and fair governance of standards where there is widespread support for their adoption.

As has been remarked elsewhere, formal standardisation is slow and cumbersome and the processes required to attain general consensus may lead on the one hand to the production of "lowest common denominator" standards or on the other to unwieldy standards which suffer from "feature creep".

Current processes for formal standardisation are often driven by academic or volunteer contributors, sometimes supported by publicly funded programmes. The resultant standards have sometimes borne little relationship to commercial realities and thus

have remained entirely unimplemented. The slow progress of formal standardisation processes have sometimes inhibited the entry of innovative products into the market. As a result, the entire standards process stands in disrepute in some learning technology circles.

To avoid unproductive standards efforts in future, there should be a clear separation between formal standardisation and specifications development. Formal standardisation bodies should represent all stakeholders; not be unduly influenced by today's market dominators; and should not even consider for standardisation anything other than stable, widely implemented specifications.

Specifications development

How suitable candidate specifications documents are produced is not critical: there is no reason why a variety of different methods should not be tried. However, the following principles appear to be important:

- The creation of specifications should involve early implementation and testing.
- The process should be iterative, allowing the lessons of implementation to inform specifications development and to catch practical problems early in the process.
- Early implementation should involve some degree of commitment from organisations which are likely to represent final users of the standard. This gives an indication that the requirement for the standard is genuine.
- Each step taken should be small, leading to agile development processes.
- Implementations should be based on relatively small initial groups which are able to resolve practical issues quickly.
- As specifications become more stable, they should be disseminated rapidly and wider implementation encouraged. In this there is a nice balance between achieving critical mass and losing momentum in ongoing technical discussions.
- Specifications should as far as possible be modular, so that different implementers and communities of practice can be flexible in their selection of standards and so that particular specifications which do not eventually attract widespread support can be allowed to fail without damaging the wider standards environment.

Availability of specifications documents and derivative works

Generally, transparency and open feedback during development benefit a standard's adoption and ultimate impact. Although there may be a case for restricting immature documents and work in progress, this practice should be avoided as far as possible.

The evidence suggests that it is very difficult to achieve a critical mass of implementation, especially among tightly-budgeted innovators, unless specifications documents are made freely available. Business models that rely on the sale of standards documents may encourage the production of standards of doubtful utility.

IP licensing restrictions that prohibit customization and derivation are inappropriate for learning technology at this time of rapid change and are incompatible with the principle of collective community ownership of standards. Different communities of practice may need to adapt standards to their own needs. While controlling all derivative works may provide a good revenue model, it ignores the inherent variability and fragmentation of even the K-12 market, and it precludes the kinds of experimentation that often leads to useful innovations.

Planning required to support the life cycle of standards

The production of stable specifications is a small part of the total effort and cost required to ensure the effective adoption of a standard in the market. Additional actions may include conformance testing and certification, production of supporting tools, the provision of technical support and the advocacy of the standard to user communities, whose awareness of the standard may be necessary to drive adoption.

There are dozens of learning technology standards, each having consumed tens of man-years in development, many of which have never been implemented in a single product. Even when adopted, the benefits are rarely realized in terms of better education and cost savings. To avoid failure in later stages, it is important to have a plan for the full life cycle of any proposed standards.

Funding

The requirement for standards to be freely available raises the question of how to fund the development of standards and candidate specifications. The funding of standards for learning systems is complicated by the fact that the monetary value of the market for technology in schools is relatively small while the collective value to society of supporting an open and innovative market is very high.

Although a range of funding options may be appropriate, including subscriptions and the provision of commercial services, it is unlikely that effective standards can be produced for this market without significant government support. Government funding should at a minimum cover the provision of freely available specifications documents, unrestricted as to the creation of derivative works.

The supporting actions described above may need to be seeded with public funds, but should eventually be self-sustaining if the standard indeed has a positive impact on the market.

Open standards and open source

Open standards and open source should not be confused. Open standards refers to transparency and open participation and to the unrestricted use of the standards to create community of practice solutions. Open source is a model for shared development of common software resources.

A primary purpose of interoperability standards (as opposed to quality standards) is to support diversity and innovation and, consistent with this objective, they should make no assumptions about the commercial model which is used to support a compliant product. No standard should advantage any particular product or commercial model. Using a particular product as a proxy for a standard favours that product and inhibits further innovation.

Open source methodologies encourage diversification while standardisation relies on convergence between different parties to create agreed specifications.

Open source projects are often funded by government, either explicitly or implicitly. There is a danger that the availability of public finance to particular projects (rather than to the overall process) may distort the process and produce outcomes which do not reflect commercial realities or genuine end-user requirements.

Open source licensing models may, however, provide valuable support for standardisation processes. Open source projects can provide a test bed for interoperability solutions. These projects can produce software components and infrastructure that in turn can be used by other software teams that are developing commercial products or working on custom solutions. The shared code can save costs and can facilitate consistent implementation and rapid adoption across systems. In some parts of the software world, where technology is changing rapidly, open source projects can provide effective interim interoperability solutions in lieu of formal standardization.

Crispin Weston and Avron Barr
7 January 2010