The emergence of pragmatic community practice and specifications. Results from the European LIFE project.

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ABSTRACT

Technical Interoperability is critical to facilitate the exchange of data, the sharing of learning resources & designs and to encourage cross cultural collaboration. However, this ideal can only be achieved when the agreed conventions involve all stakeholders in the process. The more global the agreed convention, the greater is the potential benefit.

In this paper the authors present a summary of the key recommendations for a "way ahead" to improve interoperability at a pan European level, informed by extensive consultations with international e-learning specification, standards and domain experts as part of the European Union funded Learning Interoperability Framework for Europe (LIFE) project.

The authors argue that broader community engagement is essential if we are to achieve these ambitious objectives and conclude that emergent Internet technologies and the associated emergent social practices should prompt a reconsideration of the established formal processes for the development of learning technology specifications and standards.

1: Introduction

The European LIFE project (the Learning Interoperability Framework for Europe) was set up by the European Commission (2005 - 2007) to explore practice in e-learning interoperability in Europe, to identify the current state of art, trends and challenges in a concerted attempt to produce a "Roadmap to e-Learning Interoperability" [1]. The project examined a number of learning technology domains (assessment, learning activity & content, enterprise, learner information, metadata & learning object repositories and accessibility), discussing interoperability issues with more than fifty international experts in carefully prepared expert meetings.

There are a relatively small number of interoperability specifications dedicated to e-learning, many of them produced or adopted by organisations such as the IMS Global Learning Consortium and the ADL Co-Lab. Time and effort has been invested in the development and implementation of these specifications, and they are a valuable resource for e-learning. However, in order to achieve interoperability it should be recognised that specification development has, thus far, been an exploratory process. Consequently we should reflect on both their context and use. In particular we should consider:

- Do established specifications restrict e-learning development to the technology prevalent when they were conceived?
- Are there conflicting underlying assumptions in the minds of specification developers and user groups? If so, do these assumptions have implications for their use in education?
- Are new needs emerging from the education community, or other stakeholders, which impose new requirements on e-learning specifications?
- Do emerging pragmatic community demands question the established conventions of learning technology specification development?

2: Learning meets technology

Developers often present e-Learning tools and services as "black boxes"; solutions that "just work", and practitioners are seldom able to question the rationale behind the functionality offered by these tools. Developers and tool designers can only select from the technologies available to them at the time of conception and design.

One of the most successful specifications in the short history of e-learning has been IMS Content Packaging (CP). Work on the specification commenced in the age of multimedia and the CD ROM; both the IMS CP specification and the IMS Simple Sequencing specification could arguably be viewed as efforts to enable the material produced for CD ROMS to be distributed commercially via the Web.

This explains the rationale behind the inclusion of all the resources in a single zip file format, which can be delivered by CD ROM, or downloaded, with no difference in performance.

Today we have a range of services offered by providers in different locations. In this context the use of a zip file format to deliver a self-contained study package could be considered an historical oddity. This example highlights the business drivers behind specification development and underlines the historical limitations of e-learning standards caused by the rapid development of new technologies.

Other limitations are caused by pedagogical assumptions embedded in learning technologies. For example, the underlying assumption of the Sharable Content Object Reference Model (SCORM) is that learning is carried out by an autonomous learner, at a computer and without the intervention or interaction with a human teacher [2] or peers. Similarly the IMS Learning Design specification was developed explicitly to support large-scale distance education. In practice this results in an assumption, of the concept of the cohort, and of a distinction between design time and run time [3].

In practice these specifications are applied in a number of quite different environments, illustrating that practitioners and users of digital tools often extend the scope of applications far beyond the intentions of their original designers.

It is not only learning activities that are influenced by rapid technological change; educational institutions themselves struggle to give precise descriptions of the future services they may require. They are changing their fundamental role from the provision of learning technology services to supporting the use of these services. As a consequence, more focus is required on the design of the learning experience as opposed to the delivery of content. This will have profound implications for the way specifications and standards are developed and promoted and interoperability on the broader context.

3: Do we need to design specifications differently?

The LIFE project expert consultations concluded that there is an awareness gap between the over-whelming majority of end-users and the specifications & standards community [1]. This reflects a similar gap between the pedagogical perceptions of learning technologists, subject experts, tutors and practitioners. We suggest that, historically, there has been a failure to fully recognise the requirements and priorities of end-users in the development process, and that this failure could, in part, explain the limited adoption of specifications and standards in education.

The implications of the findings suggest;

Firstly, the discourse leading up to specification development must be organised in such a way that the end-users or practitioners are engaged and further that their perspectives are fully recognised and incorporated into all stages of specification development.

Secondly, we may need to reconsider if the existing comprehensive standards/specification development, adoption and compliance process pursued by the formal specifications and standards bodies is satisfying educational community requirements.

4: Expansion of the Adoption Life Cycle Model

The LIFE project research into the process of specifications and standards development was informed by the Adoption Life Cycle Model originally developed by Olivier [4].

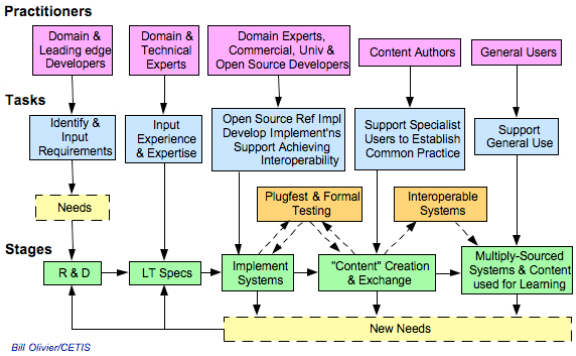

Figure 1: The Adoption Life Cycle Model of development of standards

In figure 1 Research and Development is the starting point, being informed by a Needs

Analysis, with input both from domain experts and the testing and use of specifications.

The LIFE project team was unable to identify any consistent and systematic methodology by which user communities have informed specification work, save the limited scope of work in the United Kingdom through the Centre for Educational Technology Interoperability Standards (CETIS) Special Interest Groups. We can therefore conclude that historically much of the work in the first phase of a specification process is guided by the pedagogical models that are prevalent and understood within technological research communities and stakeholders who may have vested interests in the development of particular standards (e.g. the US Department of Defence in the case of SCORM; or the publishing industry in the case of the IMS Common Cartridge, a new IMS specification soon to be published[1]).

Engaging legitimate stakeholders when formulating user requirements for specifications in what is an extremely technical process presents a very real challenge.

As a response to this challenge we have expanded the adoption life cycle model to include a model of the Needs Analysis prior to standardisation, see figure 2.

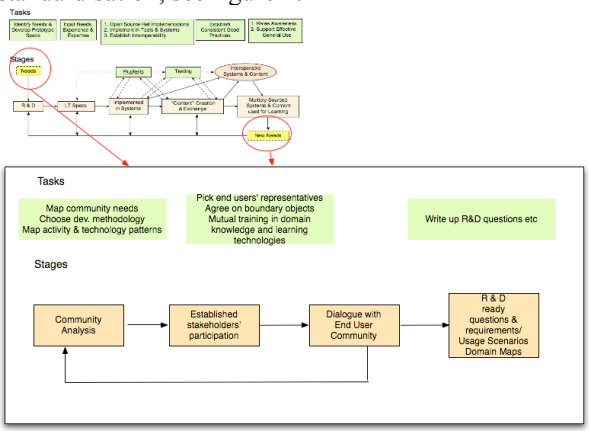

Figure 2: Model of the Needs Analysis prior to standardisation

In this model the mapping of community needs is facilitated through mapping of activity and technology patterns and in doing so, emphasising the joint work developers, end-users and their representatives should undertake to agree on boundary objects [5] and engaging in a mutual training in domain knowledge and learning technologies.

5: A new approach to specifications development

The Adoption Life Cycle Model describes primarily formal standardisation and this often results in complex and comprehensive specifications. In recent years we have observed informal specifications such as the lightweight syndication protocol RSS[2], being used to build useful services that despite being compromised from a systems integration point of view, nevertheless make applications work pragmatically. Learning, Education and Training are very complex domains, some areas (e.g. Student Management) need robust, well-integrated systems with the associated access and security protocols in place; and other areas (e.g. learning support) where much simpler lightweight solutions could be more appropriate. The development in the United Kingdom of the exchange of course records and information (XCRI) [6] application profile is another example of user requirements driven development.

It is our view that the formal standards bodies may not fully recognise this paradigmatic shift towards more pragmatic interoperability. It is also unclear if the standards bodies themselves are able to keep up with technological change as rapid as it is occurring. However, the LIFE partners have recently observed a distinct re-orientation in some of the standards community, resulting in critical reflection on our near past; embracing more emergent community based lightweight specification development. The introduction of service-oriented approaches to the Learning, Education and Training domain contributes to this development; which in turn is beginning to reverberate within the formal specifications and standards bodies. Internationally the e-Framework for Education and Research initiative (www.e-framework.org) is where we at the moment can observe these principles explored most vigorously. Here the aim is to promote an iterative development process as opposed to advocating the design and implementation of a complete Service-oriented Architecture (SOA). Most notable is the contribution of the Joint Information Systems Committee (JISC) in United Kingdom in highlighting the need for user involvement in all aspects of development, captured in the two

[1] http://www.imsproject.org/

[2] http://en.wikipedia.org/wiki/RSS_(protocol

pivotal concepts of Domain Maps and Domain Models in the e-Framework [7].

6: Conclusions and Recommendations

From the LIFE project we conclude that we are currently at a crossroads. It is, however, not a "well trodden path". The choice is between virgin territories with Travellers navigating the route by exploring the terrain through a series of coordinated expeditions attempting to find the high ground from which they can get a more informed perspective on the territory. They gather their results and try to achieve consensus on location and identify pestilential barriers to progress and how to circumvent them.

The strongest recommendations were;

To discourage proposals for monolithic system architecture and to pursue vigorously the lightweight approach to the development of open e-Learning standards and lightweight well defined API's and "plug and play" software that can be connected to existing environments.

To encourage the creation of pedagogically adaptive software, engaging practitioners, in order to harness the potential of the emergent technologies for teaching, learning and training.

7: References

[1] LIFE project report, in press. See http://life.eun.org

[2] Kraan, W. & Wilson, S. (2002): Dan Rehak: "SCORM is not for everyone", online at http://zope.cetis.ac.uk/content/20021002000737, accessed 2007-02-02

[3] CETIS position paper to the LIFE project group, unpublished

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[5] Star, S. L. (1989): The structure of ill-structured solutions: Boundary objects and heterogeneous distributed problem solving. Distributed Artificial Intelligence, Morgan Kaufmann.

[6] XCRI project http://www.elframework.org/projects/xcri (Accessed February 2007)

[7] e-Framework for Education and Research (2006): Core Components and Concepts, September 2006,