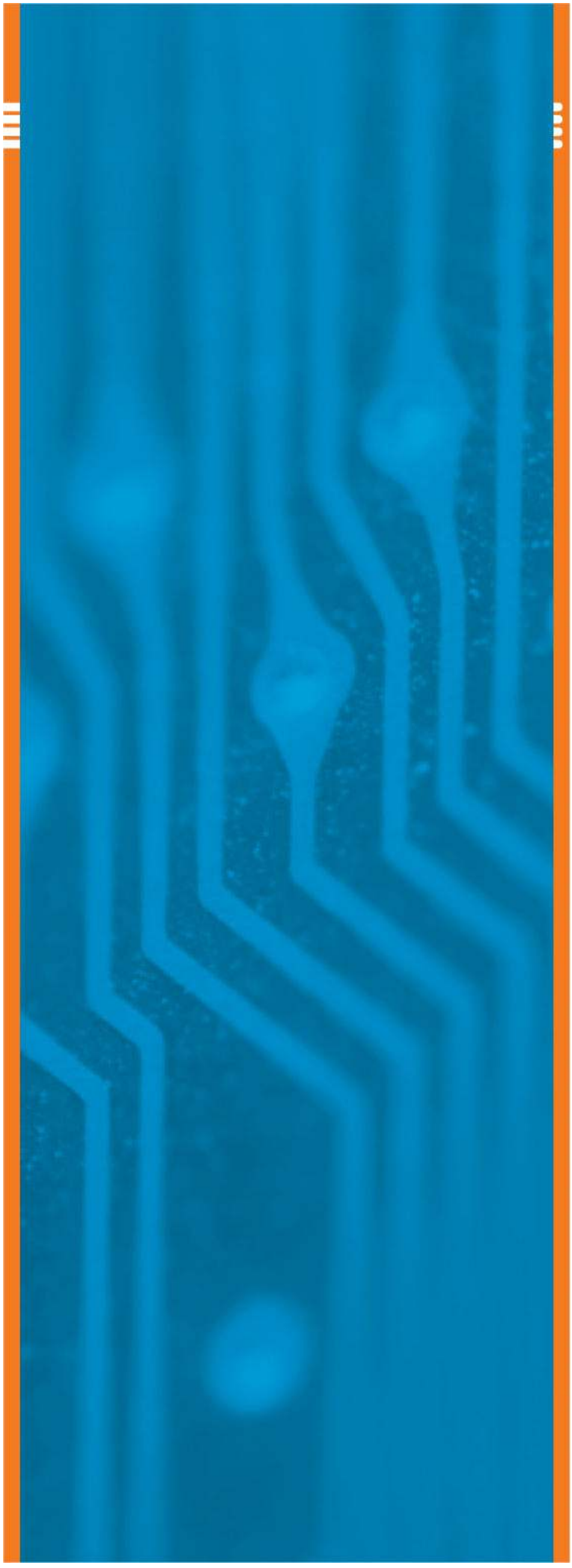

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The Future of Interoperability and Standards in Education – System and Process

A white paper

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Abstract

In January 2010, JISC CETIS organised a working meeting to bring together participants across a range of standards organisations and communities to look at the future of interoperability standards in the education sector. This paper summarises the views expressed by delegates at the meeting and presents relevant background information on present and future models for collaboration between open and informal communities and the formal standardisation system with particular reference to the current issues and barriers in specification and standard development and adoption processes. This summary also presents a series of suggestions on the possible directions of future interoperability standards in education.

Keywords: interoperability, standards, specifications, informal communities,

1. Background

Public organisations, consortia and standards bodies such as ISO and IMS have played significant roles in the development and adoption of interoperability standards in education. However, increasingly, informal open community specifications initiatives such as OpenID, oAuth, OpenSocial and XCRI have become more attractive to many in the educational technology community. We could speculate about the reasons for their attraction but the question should probably be studied more rigorously. Clearly, though, there is an interest in the affordances of more flexible and open development and adoption processes via collaborations between Formal Public Standard (FPS) bodies and these informal specification communities; for example to encourage innovation and ensure interoperability of educational technology.

The key topic for consideration at the January 2010 CETIS meeting was the relationship between specifications developed in informal communities, formal standards organisations and industry consortia. The main theme of the meeting was to explore the role of informal specification communities in rapidly developing, implementing and testing specifications in an open forum before submitting them to more formal, possibly closed, standards bodies. Seventeen position papers were submitted prior to the meeting for consideration and discussion. Around 40 delegates from the UK, Austria, Belgium, France, Germany, Greece, Norway and the USA

attended the meeting. Participants represented various international communities involved in standards development and implementation, including the IMS Global Learning Consortium and various IMS specification groups; the Dublin Core Education Community and other Dublin Core Metadata Initiative (DCMI) groups; Advanced Distributed Learning (ADL); the European Committee for Standardization Workshop on Learning Technologies (CEN WS-LT); the Institute of Electrical and Electronic Engineers Learning Technologies Standards Committee (IEEE LTSC) Working Groups; the Open Web Foundation and the ICOPER project as well as UK-based interoperability standards development and implementation organisations and communities such as the British Standards Institute (BSI); UKOLN; Becta; and the Simple Webservice Offering Repository Deposit (SWORD) and eXchanging Course Related Information (XCRI) development communities.

2. Barriers to participation, development and adoption

Interoperability standards play a crucial role in systems integration and content sharing in the education sector. There are many formal standards bodies that have become involved in educational technology standardisation, including IEEE, the International Standards Organisation (ISO) and CEN Information Society Standardization System (CEN/ISSS). There are also other user led bodies who are driving the development of specifications, including the Department of Defense's Advanced Distributed Learning programme (ADL) and the IMS Global Learning Consortium. Those formal public standards (FPS) bodies are committed to achieving educational technology interoperability standards in areas such as metadata, content, administrative (enterprise) systems, and learner information. However, it is generally agreed that the development and implementation of specifications and standards is not a simple and straightforward process. The stakeholder's interests may conflict at different stages of the standards development life cycle, and the standardisation process itself may result in "conflicting issues" (Rehak, 2010). As a result, there were signs of growing dissatisfaction amongst many involved in standards development and implementation within education, for example, Hoel (2010) argued that "the interoperability standards in the Learning, Education and Training (LET) domain failed miserably". Several issues and barriers which prevent the development and adoption of specifications and standards and hinder technology innovation in education have been identified by participants in their position papers, from the discussions and beyond:

- **Complex and inflexible standardisation processes.** Cooper (2010) reported that the development of LET standards in FPS bodies has been time consuming and ineffective. This view was echoed by the discussion, some delegates pointed out that the slow progress of formal standardisation processes has sometimes inhibited the entry of innovative products into the market and caused the entire standards process to fall into disrepute in learning technology circles.
- **Lack of inclusiveness in the process of developing and adopting specifications and standards.** Closed membership and fee-based access prevent participation in the production and adoption of specifications and standards. The business models of FPS bodies which rely on the sale of standards documents discourage wider adoption and implementation. Furthermore, "members-only" access to drafts will drive away "motivated" volunteers who are driven by the principles and values of Open Source (Severance, 2010).
- **Lack of consistent approach to allow multi-stakeholder collaboration and participation.** There are several e-learning interoperability specifications and standards, at various stages of development and adoption, that are being promoted by a number of organisations and consortiums. Most standards organisations have different business models and principles of process, consensus and openness. There is a need for a consistent approach to allow different groups of stakeholders and experts to communicate and collaborate effectively in the standardisation process of LET (Hoel, 2010).
- **Lack of early implementation of specifications.** Current formal standards tend to be supported by publicly funded programmes and developed by academic researchers and large vendors. These stakeholders are not wholly representative the potential implementers and software users and the closed processes prevents "test" specifications in the real world to address business needs at its early developing stage: are the assumed requirements meeting business needs in the

broader marketplace; is the technical approach consistent with general legacy technology or exploiting newly-adopted technologies?

- **Lack of ability to create derivative works.** Cooper (2010) recognizes that derivation from a standard to create another may cause confusion and damage the reputation of specific standards or standardisation generally. On the other hand, he argues that some forms of derivation are desirable because communities and applications differ and one size will not fit all. Controlling all derivative works ignores the inherent variability and fragmentation of the market, and it precludes the kinds of experimentation that often lead to useful innovations.

There is quite widespread feeling that institutionalised specification and standards development seems to have hindered participation, limited quality, impeded innovation, restricted agility and lead to unnecessary costs. On the another hand, a huge range of social software tools have been developed, and adopted enthusiastically by users, which do not require support for slow-moving and possibly complex standards; this in turn suggests an ever increasing challenge to established standards bodies and consortia (Kelly, 2010; Cooper, 2010). In order to support educational technology innovations there is a need for the development and adoption of specifications and standards that are less formal, less governed and aligned more closely with agile development models. .

3. Open culture and community engagement in technology development and standardisation

There is a growing demand that the process and production of specifications and standards should be more "open" from developers, users and implementers in the technical community that have grown up with the web. One of the arguments made by Weston and Barr (2010) is that open markets can stir the innovation needed to create innovative educational technology. Furthermore, it is generally agreed that the quality of specifications and standards rely on the transparency and openness of their development procedures (Currier, 2010). There have been drivers from political, business and technology contexts to promote the development and application of open source software, open content and open standards (Kelly, Wilson & Metcalfe, 2007). The evidence suggests that FPS organisations are also aware of the need for openness in order to provide successful, widely accepted standards. However, the concept of "openness" has been interpreted in different ways in different standards organisations. Andersen (2006) takes the view that, in general, FPS organisations' compliance with openness in one area tends to result in greater control in other areas. There is broad agreement that community engagement and openness are key factors in the development of LET standards (Hoel, 2010). Niche software developers, many coming with an open source attitude, have been especially strong advocates for open standards, arguing that their use will enable innovation to flourish. An increasing level of interest and engagement of people from open source communities will naturally drive the standards process to become more "open". There has been considerable engagement in informal specification communities, for example oAuth and OpenID, in the social web domain, and XCRI and Leap2A in the education domain (Wilson, 2010a). There was consensus at the meeting that those informal community specification initiatives have provided an alternative approach to promote transparency and open participation, have enabled unrestricted use of standards and have encouraged early adoption through communities of practice. Grant (2010) argued that an informal, community-driven specification initiative would be in the best position to decide if and when to offer the specification to a formal body for standardisation. However, when it comes to an open community development approach, there are a number of issues that need to be overcome both for adoption and for engagement in formal standardisation:

- **Ownership, licensing and the copyright of informal specifications.** Issues with ownership, licensing and copyright of specifications currently restrict the ability of bodies to work together effectively and to make use of specifications created by community specification development initiatives. This issue applies both to cases where IP and licences are present and to where poor process or governance has led to specifications with unclear ownership, licences or inclusion of patents. Unclear or over-restrictive IP terms may act as a brake on the adoption of specifications or their adaptation to meet changing requirements. They may also restrict FPS bodies ability to work together effectively and to exploit specifications

created by community specification initiatives. It also restricts these initiatives in their efforts to build on existing work and not replicate what has already been done by others (Wilson, 2010a).

- **Informal communities require a process to engage with FPS bodies and connection to a business need.** One of the concerns arising from the discussion was that some informal specifications begin with small funded projects or community initiatives which consist of a relatively small number of enthusiastic individuals, potentially in a limited geographical region. If this is the case, it seems that some form of organisation or gathering-place is desirable to foster engagement between these informal specification communities and stakeholders concerned with both supplier and consumer business needs (Cooper, 2010).
- **Public procurement policy does not currently recognise standards from this variety of sources.** Policy makers often fail to fully appreciate the scope and purpose of different kinds of specifications and standards. They may have concerns that informal community specifications are unstable or lack trust in their process (Hollins & Hoel, 2010). People in public administrations tend to trust the products of formal standardisation, based on the notion of stability and trust in a highly regulated process.

4. Enablers for collaboration between formal and information specifications

There is no doubt that some influential stakeholders in the learning, education and training domain are more comfortable with formal specifications. It is important that the open community development approach should have pathways and routes to move into a more formal regimes to keep people mindful of the strategic view and produce specifications that would be acceptable in higher-stakes settings. The chance of success on the wider stage would provide a positive motivation for developers to invest more time and effort in developing standards within informal specification communities (Cooper, 2010). There are several enablers that are needed in order to establish a genuine relationship which builds on collaborative spirit between FPS bodies and informal specification communities.

- **Building shared concepts between stakeholders is a key.** Fostering deep communication over conceptual models and sharing modelling process will encourage dialogue between formal and informal bodies on effective working relationships as well as providing the basis of a usable common model (Grant, 2010).
- **Criteria for enabling informal specifications to engage with formal standardisation organisations.** Identify success and failure criteria for moving and supporting community efforts to a state where they might engage with formal standards ratification. For example, the Apache incubator has many years of success in supporting communities in the whole lifecycle of open source software development and adoption. The Open Web Foundation is in the process of adapting this model for web-oriented specification development. It is important to document success and failure stories and to manage the consent process (Wilson, 2010).
- **IPR and copyright.** Clear policy statements on patent rights, licensing and rules of participation/governance are fundamental in improving collaboration between FPS organisations and informal specification communities. For example, the Open Web Foundation Agreement (OWFa) enables more formal standardisation processes to make use of informal specifications without compromising the IP and patent policies of either formal standards bodies or specification consortia (Wilson, 2010a). This provides an opportunity for formal standards to be created that build upon informal specifications.

5. Suggestions for future development

It is clear that by involving community specification initiatives in the system, we have opportunities to learn from the culture and lightweight processes of these communities, to encourage diverse participation in standardisation, and to improve the quality and adoption of specifications by taking advantage of rapid, iterative development approaches including early implementation and evaluation. The following suggestions have been made by the delegates in order to improve future interoperability standards in education (Wilson, 2010b):

- **Raise awareness, especially among policymakers, of the diversity of the standards system. Recognise, understand and work with bodies which differ across a range of dimensions - e.g. legal status, respect, trust, openness and business models.**
- **Identify solutions for patent, ownership and licensing issues to enable organisations to adopt, ratify, profile or create derivative works from specifications developed by other bodies.**
- **Improve transparency across the system and increase effective co-ordination between different bodies through more effective dissemination.**
- **Understand the drivers and motivations of stakeholders in the domain, manage conflicting expectations, and increase adoption through the involvement of more stakeholders.**
- **Learn from the culture and lightweight processes of informal specification communities, and provide support for adoption, community engagement and advocacy from incubation to adoption and beyond. Improve the quality of specifications and standards through early implementation and evaluation.**
- **Use funding support from organisation and governments to make specification documents freely available and release them in such a way that they can be incorporated into application profiles and adapted to meet new requirements.**
- **Ensure all completed standards documents and updates are persistently identified and available for reference by anyone.**

While there was considerable agreement on many issues, there were also significant differences of opinion on others. Different groups have different perspectives and in any next stage of the standardisation process it will be necessary to find a way to bring them together with a common purpose. There is no perfect solution to be found; we are dealing with a "messy problem" (or a "wicked problem"). We can, however, hope to move towards a more effective system of specification and standard development and it is CETIS's intent in promoting opportunities for discussion and debate to help us to collectively move in the direction of improvement through discourse.

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