Key Challenges in the Design of Learning Technology Standards: Observations and Proposals

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ABSTRACT

This paper considers key challenges that learning technology standards must take into account: the inherent connectedness of the information and complexity as a cause of emergent behavior. Some of the limitations of historical approaches to information systems and standards development are briefly considered with generic strategies to tackle complexity and system adaptivity. A consideration of the facets of interoperability—organizational, syntactic and semantic—leads to an outline of a strategy for dealing with environmental complexity in the learning technology standards domain.

Keywords: Complex Adaptive Systems, De-Centralized, Learning Technology Standards, Semantic Interoperability, Shearing Layers

INTRODUCTION

Many workers in the field of learning technology (LT) standards have a sense of dis-satisfaction at the amount of progress made to date, reflected in the call for papers of this special edition: “a growing awareness that standards experts and bodies have to improve both their processes and products” (Hoel, Hollins, & Pawlowski, 2009). It is, however, far from clear that other fields of IT standardization have made proportionately greater progress when considering the relatively small number of workers in the learning technology standards world. This paper considers some of the challenges arising from the character of the education system that future LT standardization must overcome or circumvent if desirable levels of future progress are to be made. In this paper, the word “standards” is used, not only for de jure standards, but for virtually any multi-laterally agreed set of technical conventions.

THE CHALLENGES OF LEARNING TECHNOLOGY STANDARDS

An Engineering Heritage

In the early stages of the development and use of the electronic computer, the biggest challenges were in the realm of engineering. Hardware, Operating Systems, compilers, data stores and programming languages/paradigms have all been developed to a phenomenal degree through engineering and use of objective measures of performance. In spite of early recognition that
IT systems are not simply mechanical – they are socio-technical - in character, computing courses have generally continued to reflect the engineering heritage.

From the late 20th century, it has become progressively more clear that failure to account for complexity and socio-technical factors is severely limiting the effectiveness of ICT interventions and organizations (Bullock & Cliff, 2004) (Mumford, 2000). The recognition of this problem is not, however, a solution; the solution is hard and we live with the challenge of moving on from our engineering heritage in LT standardization as well as in IT systems design.

**Connectedness of Concepts and Unknown Bounds**

“Connectedness” is used to express the idea that almost anything that is the subject of a communication, i.e., is information, could also be the subject of a communication with different intent and effect. Any boundary around a collection of concepts is arbitrary. At best it is a commonly-adopted convenience, commonly it is an un-conscious artifact of a particular application or context, and at worst it is an insufferable impediment. When there is a high degree of uniformity in, and dominance of, a process, the “commonly adopted convenience” becomes a cause of greater efficiency and it may be possible to package the whole as a standard. In the absence of dominance and uniformity, a conscious and reflective set of compromises becomes necessary.

The challenge for learning technology standardization is that the dominant and uniform processes are generally either not there or not easily seen. The typical case seems to be that any information about subject is used in many ways. For example, information about the content and structure of a university course appears in numerous processes/activities, each claiming some kind of authoritative status: design and validation, marketing, management information, e-learning platform, diploma/transcript, etc…. This appears as a general feature of information systems and is a problematical one if the large number of person-years spent on integration projects - where the consequences of un-conscious and un-reflective compartmentalization are partially compensated for - is taken as a measure.

There are some exceptions to this general challenge, counter-examples where there is a sufficiently isolated sub-domain and cost reductions that make for a proven business case. The most clear counter-example is content/delivery-platform interoperability in aviation maintenance and military training where the case for formalized approaches is clear (Jeffery & Bratton-Jeffery, 2004); a platform from which ADL SCORM could become widespread.

**Complexity of the System**

The education system is, of course, not an isolated system. Through the action of individuals, technology and social practices bleed-in to education from general civil life. Its inextricable binding into the social, political, technical and economic structures and collective intentions, combining elements of control, choice and autonomy, suggests that it should be considered a social enterprise.

Compared to a business enterprise, the workings of the education system as a whole are rather messier but it is worth considering the response of the business IT world to its far-from-simple environment. Historically, the problem of engineering IT in the business enterprise has been seen as a complicated task and approaches under the banner of Enterprise Architecture (EA) developed to increase the effectiveness of business IT developments. The inspiration for EA, according to John Zachman, the man credited with inventing it, arose from industries such as building and aerospace (Zachman, 2008), where the scale of operations had been previously overcome.

As time has gone on, the business world has become more complex and the problem of IT alignment to business need has presented business with more than a complicated engineering problem. One reaction to this change has been a move to see Enterprise Architecture as being more related to business strategy (Ross, Weill, & Robertson, 2006). This view emphasizes the...
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