Problematizing the Way we do Standards – Focussing more on Scope and Rationale

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Abstract: This paper brings together two perspectives on current developments in information and communications technology (ICT) utilized for the purposes of learning, education, and training (LET). One perspective is concerned with governance and legitimacy issues regarding the process and relevance of standards development; the other, is concerned with the role of discerning relevant questions in LET and the potential scope for innovation that might develop tools to support such discernment. Discussion of information systems architecture is introduced as a means to set the context and provide a framework for bringing together an overall narrative and coherence to these two perspectives. Questions initiated by 'why' are of particular interest because they typically demand an explanation in natural language to satisfy the questioner. By focusing on 'why' as a key 'primitive' of enquiry the authors present an approach that might inform improved processes of ICT for LET (a.k.a ITLET) standardization.

Keywords： standards governance, ICT standards, e-learning, information systems architecture, enterprise frameworks, ITLET

0 Introduction

Standards play an important role in all economic domains of human activity. Protocols and conventions have a broader reach. One thing that is common to each is explicit consensus, a stable reference point that is often documented. Standardization is also enabled by and inextricably linked to innovation in an iterative process of mutual stimulation. Much of the seemingly unfettered domain of Web 2.0 would not exist without standards. Nor would the information and communications technology (ICT) used during e-learning. Despite this, stakeholders and other beneficiaries of these technological achievements have little time for standards development, perceive it to be burdened by archaic process or even irrelevant and, if anything, a hindrance to innovation: in short, question its legitimacy. So the question arises: *why?*

To localize shortcomings of current standardization activity within learning technologies Hoel and Hollins (2008) developed a model describing input and output factors that contribute to the overall legitimacy of these standards. The input legitimacy factors relate mainly to the process, while output legitimacy factors relate to the product (i.e., the technical standard), hence the name Process and Product Legitimacy model (PPL), see Table 1.

Table 1 *Process and Product Legitimacy model of standardization*
(Hoel & Hollins 2008)

Input legitimacy	Output legitimacy
All 'interests' considered and ideally represented	Inscription of stakeholders' interests
Open process	Enactment status (is the specification implemented and used in services?)
Balanced choice of Standard Setting Body	Technical maturity of the specification

Learning technology standardization (a.k.a. ITLET standardization) is a typical example showing the issues, problems and contradictions evident within the field of standardization. Rather than creating stable points of reference, supporting interoperability and minimizing informational transaction costs (Egyedi et al. 2008) in systems already adopted the focus of this standards community is often on anticipatory standardization (Jakobs et al. 2001), which is part of a global innovation enterprise with a host of complex knowledge management challenges (Tidd & Bessant 2009).

To establish stable reference points for emergent technologies seems a contradiction in terms. Therefore, knowledge exchange and discussion about the impending task are crucial. Hoel and Pawlowski (2011) proposed the concept of Key Knowledge Sharing Point (KKSP) to study the crossroads in global innovation and international standardization. A KKSP is defined as the intersection between three key aspects of knowledge sharing: the Knowledge, the Sharing Point, and the Timing. An initial validation of the concept in the context of ITLET identified the need for further conceptual development, using the 'primitive' why (asking why, knowing why, understanding why) as the entry point for crucial design decisions (Hoel & Pawlowski 2011).

This paper explores how why-questioning could be used as an analytical lens to study, and perhaps improve, the process of ITLET standardization, especially in the initial scoping phase of a standards project. A validation of the value of why-questioning is highlighted in two case studies. Based on these studies the authors propose strengthening the motivation, purpose, and rationale for standards making in order to contribute to the ongoing discourse in the community how to improve the legitimacy of both the ITLET standardization process and products.

2. Related research

While ITLET standardization has a well-defined scope within the formal context of ISO standards development an audit of activity over the last 12 years that includes industry consortia (e.g., the IMS Global Learning Consortium) and related standards bodies (e.g., the IEEE LTSC) reveals:

(1) Despite sufficient stakeholder "buy-in" being achieved to justify the process only a small percentage of the actual technical outputs have resulted in specifications or standards that actually serve the industry well; and,

(2) The scope of activity has evolved rapidly from the tightly engineered perspective of early Computer Based Training (CBT) to one that has embraced the flexibility of loosely orchestrated Web 2.0 services and applications.

In fact, there exist numerous examples of learning technology organizations that have been short-lived in some jurisdictions (e.g., PROMETEUS) (Collier et al. 2002). Thus, it is reasonable to now describe the ITLET domain as both complex and emergent.

Cooper found that "the challenge for learning technology standardization is that the dominant and uniform processes are generally either not there or not easily seen" (Cooper 2010). He used the terms complicated, complex, emergent and adaptive to characterize the ITLET domain. This description is consistent with characterizations of the evolution of Knowledge Management representing a shift in paradigm from a principle of reduction toward a principle of emergence (Snowden 2002, 2005; Wierzbicki & Nakamori 2006). For Wierzbicki and Nakamori (2006) this closely reflects a shift in the philosophy of science itself; while for Snowden (2002, 2005), complexity represents a natural domain that requires rigorous sense-making.

2.1. Zachman Framework – Why as a part of purpose description

With increasing size and complexity of the implementations of information systems, it is necessary to use some logical construct… for defining and controlling the interfaces and the integration of all the components of the system. (Zachman 1987)

These opening lines of Zachman's seminal article describe what has become known as the Zachman Framework, the most influential Enterprise Architecture Framework till now. Zachman used classical architecture to construct his framework. He soon realized that the different "players in the game" (the owner, the designer and the builder) all had different fundamental architectural representations. Reflecting on a house building project he observed that

a. There is a set of architectural representations produced over the process of building a complex engineering product representing the different perspectives of the different participants.

b. The same product can be described, for different purposes, in different ways, resulting in different types of descriptions. (Zachman 1987)

Combining these two ideas suggested that for every different type of description, there are different perspectives and representations for each of the different participants. Zachman gives emphasis to "three descriptions" of information systems architecture: what the thing is made of (or the "material" description); how the thing works (or the "functional" description); and where the flows exist (the connections, or the "location" description). In an appendix he includes "for further reference" characterizations of additional descriptive types related to people (who), time (when) and motivation (why).

The success of the Zachman Framework is clearly linked to the use of the simple questions so familiar to all user groups (hence also the key decision makers of whether to use enterprise architecture). The primitives mapped nicely to different aspects of information systems design: Data (what), Function (how), Network (where & who), People (who), Time (when) and Motivation (why). However, as with Zachman's first paper some

constructs take precedence over others in the day to day running of business. Jovanovic et al. (2006) have mapped the 13 diagram types in Unified Modeling Language version 2 to the Zackman Framework. Their table shows that the more concrete aspects are better covered with representational tools than the motivational. Thus, this indicates there is scope for more development of constructs to support the information systems design.

2.2 A Model for Sense-Making

Mason (2008) presents a model in which why-questioning is viewed as an important instigator of sense-making and hence, learning and knowledge creation. In this model, emphasis is placed upon a set of primitive questions: Who, What, When, Where, How, and If. As a consequence, a broad context is established which might inform future design and implementation of ICT systems developed to support LET. The immediate consequence is that without why-questions, and their answers explicit, understanding is limited. This model can also inform the substance of the "why description" of the Zachman Framework. This is not a simple task and why-questioning is a current topic tackled by researchers in computational linguistics (Verbene 2010; Theijssen 2008) and intelligent tutoring (Graesser et al. 2007).

Why descriptions present a number of challenges principally because questions that are initiated by why can be categorized into various types: such as motivational, circumstantial, teleological (purpose), or causal (Verbene 2010; Theijssen 2008; Graesser et al. 2007, 2008; Evered 2005). Even in the seemingly straightforward causal type there is significant difference in the explanatory detail required from a question concerning why salted water boils at a higher temperature to pure water and why cancer is a difficult disease to cure.

In his brief treatment of the why description Zachman suggests most value might lie in descriptions that emphasize "why choices are made", which is to do with perspectives of motivation and purpose. Such an approach would be useful in general sense-making; however, there are wider implications. In any organizational setting questions of motivation can also raise issues of governance – e.g., if someone on a standards meeting votes with motivations for personal gain (e.g., career or idiosyncrasy) as opposed to corporate or institutional best interests. While most why questions will typically demand an explanation as an 'answer' or response there also exists significant semantic and syntactic diversity among them to present a challenge for designers of ICT tools that specifically support why-questioning. Consider, for example, the following questions:

Why did you vote that way?
Why is this standard necessary?
Why has this been proposed?
Why does the reporting template require all these fields?
Why should we implement this procedure?
Why do our stakeholders think this work is irrelevant?
Why is standardization misunderstood?
Why do industry consortia 'compete' with standards bodies?
Why all this bureaucracy?
And, of course ... *Why not?*

3. Deeper Analysis through Questioning Why

From a theoretical perspective this paper is concerned with the role of why-questioning in the context of analyzing standardization activities. It is informed by legitimacy models (Hoel & Hollins 2008), lifecycle models (Cargill 1989), process models (Egyedi 1996) and information system design (ISD) models (Leppänen 2005). The aim is to contribute to the construction of an analytical lens to be used in identifying the Key Knowledge Sharing Points (Hoel & Pawlowski 2011) that are critical for making design decisions.

From an information science perspective Who, What, When, and Where collectively form what can be termed the "primitives" of text-based information retrieval. However, Learning, Education and Training involve more than the retrieval and exchange of information. In order to harness sufficient knowledge from the different stakeholders that might inform the design of innovative future technologies, questions also need to be initiated by How and Why.

Evered (2005) offers a typology of explicative models in which the explanative function of responses to 'why' questions is further analyzed according to three classes of explanation: Causal (Why E? Because C (C= cause)); Teleological (Why E? In order to P (P = Purpose)); and Gestaltic (Why E? For these reasons, R (R = Reasons)). This classification assists in sharpening the dimensions of motivation and purpose as the one kind: teleological. And while the other two dimensions are important when considering the design of ITLET systems per se, the causal and gestaltic aspects of why-questioning are not particularly useful in the kind of analysis and explanation required in standards development.

4. Case studies

Two case studies are chosen to see how why-questioning has been part of standards adoption and development within learning, education and training. A qualitative document study was carried out using archival documents and participant observations analyzed through an iterative process of coding and interpretation.

4.1 Why adopt the Sharable Content Object Reference Model (SCORM)?

Our study of documents related to technical development and adoption of SCORM since the first version was published in 2000 shows significant ambivalence by stakeholders as to its suitability, possibly because its scope was never made explicit (SCORM 2000). This lack of upfront explanation made it challenging to understand why it should be adopted.

Questions of what pedagogical approaches SCORM supports have also often been raised by stakeholders. Such questions are clearly to do with efforts to understand the model – what its purpose is, how it achieves its goal, and why it is relevant. When the current version of SCORM was balloted in ISO/IEC JTC1 SC36 two national bodies observed there was no scope statement in the standard, and proposed adding a statement, suggesting training as the remit. At the same time SCORM was submitted to ISO (2007) the US Department of Defense wanted to hand over the stewardship to a new organization, LETSI. First when it was clear that this was not going to happen, and LETSI would not use SCORM as their base standard, the organization stated (June 2010) that "current SCORM-style LMSs seem at best, 'quaint' (..) It is clear that the current SCORM specification is in need of a radical update".

An unprecedented discussion on the pedagogical affordances of SCORM was provoked in 2011 by a US Department of Labor bid mandating SCORM for e-learning systems and content. Only after a few weeks heated debate Directive was rescinded (February 2011). Then the full range of SCORM shortcomings had been presented in a condensed and focused way the authors find no parallels to in the discourse that has been going on for nearly a decade.

This small case study shows that the question why the standard should be used outside "some very niche training needs of the Department of Defense" (as seen by the head of a competing standards organization) is not addressed by the "entity that controls SCORM" in the standard documents themselves or in marketing presentations. The SCORM overview document specifies under the term "ilities" a "Conceptual Starting Point" (Accessibility, Adaptability, Durability, Interoperability and Reusability). Clearly, a rationale can be inferred from this, but, as one balloting comment pointed out these as marketing terms rather than an explicit discussion of scope.

4.2 Why develop New Work Items?

The second case study analyzes 16 proposals presented to the Workshop on Learning Technologies of the European Committee for Standardization (CEN WS-LT) in order to determine how the technical approach was motivated in New Work Item descriptions.

Our first observation is that international rules for how to structure and draft international standards is based on a performance approach designed to leave maximum freedom to technical development: "Whenever possible, requirements shall be expressed in terms of performance rather than design or descriptive characteristics" (CEN 2007; ISO 2004). However, a side effect of this general principle may be that discussions on methodological approaches are subdued. In the case of European Commission funded standardization performance is defined as European policy and market relevance, which is reflected in the NWI template used by CEN WS-LT.

The template asks for a work plan, milestones and deliverables. Therefore, process is addressed more from a project management perspective, scheduling establishment of project teams and deliverables, and documenting that relevant stakeholders are represented. The workshop itself is the process, and the methodology is, with a few exceptions, delegated to the CEN WS-LT projects and their participants. Overall, methods are understood as execution of the consensus developing script that comes with the CEN Workshop: formation of project team, presentation of drafts to the meeting, submission of interim reports, and finally publication of the Workshop Agreement.

How do the proposals address the purpose of the technical artifact that should be the outcome of the standardization process? Again, the template can be seen as guiding the project description in the direction of the economic-political context, leaving out the aspects more related to the domain, e.g., the pedagogical need for the standard, or why it is relevant.

The authors of the proposals know that the funding agency is more interested in market impact than technical soundness. They may even think that an overly technical description of the objectives may be a

disadvantage when the proposals are evaluated. Our analysis shows that the approach towards both object (standard) and method is discussed indirectly by relating the proposed work to alternative standards or candidate standards for harmonization, extension or profiling.

Even if the why question is not explicit in a proposal for a new work item it might be elaborated by the team when starting the specification work in order to know what "the right thing to do" might be. However, participatory observation of the CEN WS-LT over a number of years shows that when a project is accepted, work commences immediately on the data and information models. Even if the scope is not well defined or a better understanding of the domain would have been helped by conceptual modeling or other measures, questions about motivation and purpose would hardly be understood by the project team.

5. Discussion

Good standards governance is about maintaining robust processes of scoping, specifying, and negotiating that ultimately lead to the adoption of standards that are fit for purpose. Ensuring trust from stakeholders of both process and outcome is essential. The challenge is that investing in standards-based development comes with certain risks – for example, mature standards are not always in synch with trends in innovation or stakeholder requirements. It is clear from the case studies presented in this paper that process legitimacy is easier to establish than the product legitimacy. In the case of SCORM, process legitimacy has been installed partly through effective marketing combined with good documentation, complementary actions (e.g., establishment of ADL laboratories worldwide), and the fact that the standard was mandated by one of the world largest buyers of learning resources. Also, the process legitimacy was boosted when the US Department of Defense submitted SCORM for standardization by ISO in 2007.

However, good governance is not only about openness and transparency; it is also about accountability made explicit through clear protocols and rationale for decisions taken. Clear rationale and explanation is what why-questioning seeks. Thus, when a New Work Item is presented to a standards group a well defined scope is required in order to commence work, let alone deliver a specification fit for purpose – though, this is not always sufficient. The second case study also shows that critical scoping is not always driven by questions that give directions for technical specification work. When 'why this standard?' is asked within a political or economical context only, the question of 'why this particular design of the artifact?' is left out. While this latter question may not seem technically essential explanations that address it would ensure better buy-in and a more effective process.

As an analysis tool why-questioning requires clear explanation; however, this study shows that the question also needs to be refined in order to guide the technical work in a standards committee. Leppänen (2005) has suggested utilizing the intersection of two perspectives – the information systems (IS) perspective and information system design (ISD) perspective – to construct questions guided by the questions why, what and what does it mean. This intersection results in nine kinds of questions not found in the data of the case studies. For example, why-questioning at an IS level is Why is this standard developed and for whom (scope relevance); and at an ISD level, Why is this design applied – and who is benefitting by it? The question that logically emerges for a standards committee to address is: What purpose does this particular standard address using the ISD method chosen?

The evidence at hand shows that this line of questioning or analysis is not typical within the standards community, at least not as part of defined procedures of work. For practitioners in this field teleological questioning is an extracurricular activity on par with dreaming up an economic rationale for funding (e.g., "gives access to millions of learning resources"). However, if why-questioning is refined to address and surface methodological reasoning that relates directly to the design challenge at hand, this would likely have a positive impact on the governance of (ITLET) standards and their legitimacy.

6. Conclusions

This paper suggests an approach that might deliver an improved governance process of ICT standards within the domain of Learning, Education and Training, an emergent field which spans a wide range of stakeholders and usage scenarios. Knowledge about the different processes that are involved in standardization activities may be created applying the questions that sometimes are referred to as the "journalists' questions": "who, what, when, where, how, and why. Such an approach aligns well with the Zachman Framework. Importantly, through considered application of why-questioning ITLET standardization activities could develop clearer rationale and explanations as part of the documented process of standards development, enabling more effective scrutiny and understanding by stakeholders. Analysis of existing documentation reveals that the depth of explanation is often underdeveloped, typically bypassing questions that address purpose, relevance and Information Systems Design.

Through considered and consistent application of why-questioning it is likely that answers to questions of relevance will be more readily answered. A number of future research activities that build on these findings also look viable: identifying methods of question generation (Graesser et al. 2008) and application to ITLET standards development; and, probing other frameworks developed for making sense of emergent fields (Snowden 1999).

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