# Standards for Learning, Education and Training
# – a proposal for an improved process

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*Abstract*— **The standard setting process within the Learning, Education and Training domain needs to be improved to strengthen the legitimacy of these standards. When new work items are proposed in the domain alternative methods to technical solutions are seldom discussed. This is shown in a small case study presented in this paper. To guide a methods discussion the authors propose a new framework for LET standardisation with constructs from four ontologies and a four-step process. The model is meant as a toolbox to be used to ensure that issues related to both the process and product legitimacy of standards setting are addressed.**

*Keywords-interoperability standards development; standards adoption; standards legitimacy; standards governance*

## I.    INTRODUCTION

The authors argue that Standards work in the Learning; Education and Training (LET) domain is facing a legitimacy problem. The LET domain is characterised by rapid development of new technologies and continuous adoption of new work processes. It is not evident that conventional standards body approaches are the most appropriate to the advancement of learning technologies. However, without a consensus on a semantic, a pragmatic, and a syntactic level it is difficult to exchange the necessary information. When a new standardisation work item is started it is the definition of scope that provides direction. In this paper the authors focus on the scope definition process of LET standardisation and explore how this could be improved in order to ensure legitimacy of the output. The authors provide a case study based on current work within the CEN Workshop on Learning Technologies. Underpinned by their findings the authors highlight key considerations that could provide input into a more informed standardisation methods framework.

## II.    BACKGROUND

In previous work the authors presented a Product Process Legitimacy model (PPL), standards model (Figure1).

| 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 |

When discussing scope of interoperability standard we should step back and reflect upon the role of such standards. Whilst the overall objective is to facilitate the need for systems to interoperate, "standardisation has many meanings and motives: the uniformity of production, the compatibility of technologies, the objectivity in measurement, the means for justice and a form of hegemony" [7]. Even if interoperability is the expressed motive, other motives should not be overlooked. The pragmatic and technical aspects should be given equal consideration within the process.

There are existing frameworks for evaluating standards but authors experience over the last decade is that cross-domain perspectives are not well represented in learning technology standardisation for. Sartipi and Dehmoobad [9] have observed that most research challenges focus on interoperability within the same domain.

*"However, provision of cross-domain interoperability among collaborating domains is a new challenge that needs more attention from the research community. Such interoperability requires data and service extraction to obtain common subsets of information and services in collaborating domains, e.g., healthcare and insurance" [9].*

## III.    NEW WORK ITEM PROPOSALS FOR LEARNING TECHNOLOGY STANDARDS

The authors have analysed a number of proposals presented to the CEN Workshop on Learning Technologies

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in an attempt to identify common factors that contribute to the process or product legitimacy of the final standard.

The CEN WS-LT produces Workshop Agreements and is an Open process. CEN and ISO have introductory phases where broader discussion could take place (called a Feasibility Study (CEN) or Study Period (ISO)). However in enactment discussions regarding methodological approaches often are consigned to the background.

In most proposals, the process descriptions are strongly guided by the NWI template, which effectively steers projects from a process/project management perspective.

In one specific proposal we find a methodology, which outlines the "development-oriented activities in the production of a well constructed ontology". In another proposal we find conceptual modelling combined with a discourse and validation phase as a methodology to make sure the standard is aligned with the stakeholders' domain view. Overall, methods are understood as execution of the consensus developing script that comes with the Workshop on Learning Technologies: formation of project team, presentation of drafts to the meeting, submission of interim reports, and finally publication of the Workshop Agreement. The authors argue that many proposals do not address pragmatic application or use of the standard being developed.

Our analysis indicates that the approach towards both object and method is discussed indirectly by relating their proposed work to alternative standards or candidate standards for harmonisation, extension or profiling. One example is this striking suggestion in one proposal on interoperability of registries: *"In general terms, the goal is to make the envisaged specification as simple as possible ... but not more! This implies, among others, that we will consider web technologies like RSS and OPML, besides more traditional approaches based on UDDI or IESR."* It is not evident what "simple as possible, but not more" means, other than pointing in the direction of RSS, a very simple, but influential community developed web standard.

We should, not expect too much from NWI descriptions whilst the context remains funding, market relevance and feasibility of the project. However, the question remains: When a project commences how do we ensure that the issues influencing the output legitimacy of the standard are raised in time to make better decisions? Participatory observation of the CEN WS-LT over a number of years shows that once accepted, work starts immediately on the data and information models. When there is no consideration of a conceptual model of the domain, how do the project teams harness the knowledge of domain experts?

Form this the authors conclude that the current CEN WS-LT process serves the *process legitimacy* considerations better then the *product legitimacy* ones.

The model that will help us answer these questions will be of a *prescriptive* nature giving some advice on how discussions should be structured to enhance the standardisation process.

The PPL model was based on a simple separation of input and output factors, the former much related to setting up the process; the latter focussing on the end product and its

inner qualities and enactment in learning technology systems. Our analysis of proposals has identified that we need concepts that better capture the characteristics of the application domain, and of pragmatic requirements, a framework that lets us discuss different methods and solutions related to these requirements, going beyond the formal issues related to SSB procedures and stakeholder representation.

Figure 1 gives an overview of these concepts, which are ordered in four context ontologies: The Domain Context ontology, the Layers Ontology, the Perspective ontology and Models ontology.
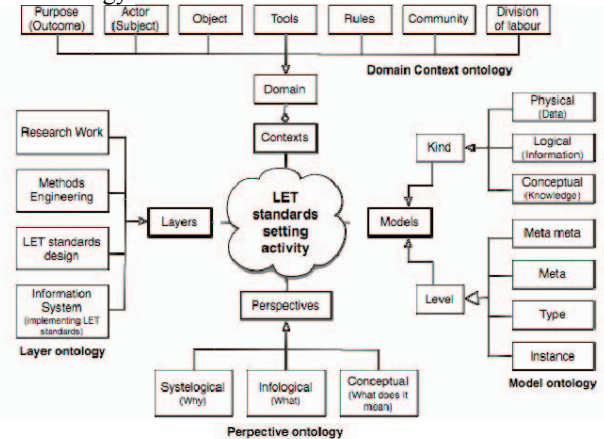


Figure 1 Candidate constructs for a LET standardisation domain framework organised in four context ontologies (adapted from Leppänen [17]).

Figure 1 presents a toolbox to be used for establishing a framework that would for example enhance the quality of the discussion leading up to a New Work Item in a LET standards group. The concepts are partly overlapping, e.g., a purpose and a systelogical (why) view on an activity may point to the same answer. However, a prescriptive model describes a process where related questions will be asked at appropriate stages.

The authors propose a four-step process for an improved LET standardisation based on our candidate constructs.

*First step* will be to analyse the history of the proposal, the application domain and the basic assumptions of the project. This is done using the Domain context ontology. The ontology includes constructs that may help make sense of any contradictions found. The historical, application and basis views analysis will help direct the new standardisation project. However, the authors recognise the need to look beyond the current project and to maintain an awareness of cross-domain interoperability goals.

The *second step is* to add to the framework model a competing or contrasting activity system working towards the same outcome. This could be a project working on similar tasks on a national level, in other countries, in other standards groups, or at other times in history, etc. The main objective of this alternative system is to constantly challenge the development team proposals.

The *third step* is to analyse information systems layers through perspectives. After having established the context of

the project, the focus will be on the object of the activity, the consensus on the draft of a new standard. If we analyse the different processing layers through the perspectives we have identified, we should come up with a number of general questions that could provide heuristics in a LET standardisation framework. Table 3 provides a summary of such questions.

TABLE I.     ISSUES IN THE INFORMATION SYSTEMS DESIGN CONTEXT, STRUCTURED THROUGH ISD PERSPECTIVES AND INFORMATION SYSTEMS PERSPECTIVES.

| IS perspectives / ISD perspectives | IS-Systelogical: Why is a LT standard developed and for whom (scope relevance)? | IS-Conceptual: What is it that the LT standard refers to? | IS-Infological: What is the LT standard describing? |
|---|---|---|---|
| ISD-Systelogical: Why is the IS Design applied – and to whose benefit? | What are the LT standard purposes that the ISD method address and why is it chosen? | What are representational artefacts used by the standard, and why are they accomplished by this design? | What are the descriptions accomplished by the design approach – and why these (and not others)? |
| ISD-Conceptual: What is the design reference framework - and how is it used? | What are the concepts used to refer to standard's purpose? | What are the concepts used to refer to phenomena in the ISD contexts? | What are the concepts used in the standard? |
| ISD-Infological: What is the design actions and deliverables? | What design actions are done to specify the LET standard purposes? | What is done in design to specify LET domains? | What is done in the design of the IS descriptions? |

The *fourth step* is choosing the optimal modelling level and kind. Designing a standard is done both through abstraction and specialisation, both bottom-up and top-down. Where the team starts is often a question of who is participating and what legacy systems or standards are involved. By using the domain context ontology, examining the purpose stated in the scope of the project, redoing the stakeholder analysis, calibrating the modelling tools, etc. the project team could be advised to justify the kinds of model they work with at the different stages of the project. Analysing the choices through the perspectives we have identified in the perspective ontology would result in the steps we have summarised in Figure 2.

Figure 2 Summary model of LET standardisation prescriptive framework

## IV.   CONCLUSIONS AND FURTHER WORK

This paper is a contribution to improve the process and outcome of standardisation within the LET domain. The model presented is underpinned theoretically by information and educational science. It remains to be seen if the guided use of the constructs presented encourages more discussion around methods in order to achieve a successful outcome.

The real challenge is to design a descriptive framework that, depending on the application domain and task at hand, guides us on a particular course of action as a result of a professional discourse and consensus and not out of preconceived positions.

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