Deficiencies of scope statements in ITLET standardization

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Abstract: To execute good design one not only needs to know *what* to do and *how* to do it, but also *why* it should be done. For a standardization expert the rationale of a standardization project may be found in the proposal for a new work item or terms of reference, but rarely in the scope statement. However, it is also commonplace that the rationale of the project is not clearly stated in any of these parts. If the rationale is not surfaced in the early phases of a project, it is left to the design, sense-making and negotiation cycles of the design process to orient the project towards a goal. This paper explores how scope statements are used to position standardization projects in the IT for Learning, Education and Training (ITLET) domain, and how scope and rationale are understood in recent projects in European and international standardization. Based on two case-studies the paper suggests some actions for further research and improvement of the process.

Keywords: rationale, LET standardization, scope, purpose and justification of standards, process improvement

1. Introduction

Development of formal standards within international standard setting bodies (SSBs), like the International Organization for Standardization (ISO), progress through well-defined stages [1]. Any specification work, if required, takes place at the Preparatory and Committee stages, based on premises defined in the Proposal stage. In theory, when technical work starts, experts engaging in the process should understand why the project has been initiated, what can be realistically achieved, and where or how they should focus. In practice, especially with anticipatory standardization, participatory observations reveal that this is not always a straight-forward process and the rationale, scope and methodology of the project may be less than clear.

This paper focuses on the first stages of formal standardization and asks whether the process is sufficiently optimised to give participating experts a clear direction for technical development. To establish context, this paper looks at the Directives of ISO to get an overview of the formal requirements for establishing New Work Items (NWIs). Following this, more detailed research questions are developed.

1.1 The proposal process – justifying new work items

To present a NWI for ballot by national standards bodies the proposal needs to contain basic information structured by a template: a title, scope, a description of purpose and justification, program of work, and information on resources to be provided, etc. The

section on purpose and justification should, according to the ISO Directives, explain *why* the standard is needed [1]. However, in the end, the acceptance of a new project is not measured by well-stated justifications. In practice, it is the weighting of votes cast by national bodies that is critical. Ideally, the scope statement is not supposed to change during the development from New Project to an International Standard.

How much of the justification, or initial rationale, is carried through to the later stages of the standardization process? Drafts of the standard will adhere to another template, laying out sections on Introduction, Scope, Normative References, Terms and Definitions, etc. There is no explicit placeholder for 'Purpose and Justification' in the template used by formal SSBs like ISO or CEN. Of course, the Introduction could give information about "reasons prompting its preparation", but the Directives warn, "it shall not contain requirements" [2].

Technical experts joining the project at the Committee stage will use the scope as their primary reference point in drawing up directions for their work. As formal standards development is a very document-driven process, the tug of war over wording is not about purpose of the work, but about scope and technical specifications. Thus, the question arises as to whether the scope allows any reasoning about why the standard is developed.

1.2 Defining scope of international standards

Statements of scope used by ISO serve a number of functions, including as a summary for bibliographic purposes. Therefore, it "should be succinct" [2], and it "shall precisely define the limits of the field of activity" [1]. Activity in this context can be defined from both an internal and an external point of view. The perspective of the ISO Directives [1, 2] is the latter. The scope is a statement precisely defining the limits of the work of a technical committee; "it assists those with queries and proposals relating to a field of work to locate the appropriate committee" [1].

Participants in standards projects may testify that scope statements also have internal functions, e.g., in focusing the work. However, the rules on how to draft the scope may constrain its usefulness in this respect. The Directives give clear rules stating that the scope should be "worded as a series of statements of fact" [2]. Scopes "shall not repeat general aims and principles governing the work of the organization but shall indicate the specific area concerned"; and "It shall not contain requirements" [2].

Scope statements are about setting constraints, boundaries and limits. As such, they can "help guard against moving outside the field of activities authorized by the parent committee" [1] – or, as commonly referred to as, "scope creep". If the boundaries are not defined clearly by scope, exclusions can be added. However, the Directives also warn against "self-evident exclusions" [1].

It is therefore evident from the ISO Directives that the question *why* a standard is to be developed plays a certain role in the Proposal stage of a project, but a more limited role in the Preparatory and Committee stages, where the *what* question is foregrounded. The question *how* a standard should be developed is also of great interest to project participants. As this question is very much dependent on context, the Directives give no guidelines. On the contrary, they explicitly warn against specifying design methods, referring to the Performance approach in the Rules for the structure and drafting of International Standards, to "provide for maximum freedom for further innovation" [2].

Formal standardization, at least as described in the guideline documents analysed above, seems to leave issues of purpose and justification behind when the actual technical work begins. This raises the following research questions:

- What role do conversations about rationale play in requirement elicitation and technical specification work of ITLET standard groups?
- How are the *Why*, *What* and *How* dimensions addressed in scope statements of ongoing and published projects of international ITLET standardization?
- Can an analysis of practices related to scope statements in ITLET give any clues to shortcomings in the processes or any input into practice improvements?

The first question is addressed through a literature review within the field of requirement practice and standards governance. The second question is addressed through two case-studies drawn from CEN Technical Committee 353 *Information and Communication Technologies for Learning Education and Training* (TC353) and ISO/IEC JTC 1/SC36 *Information Technology for Learning, Education, and Training* (SC36). Based on an analysis of these data, proposals are made for further research and consideration in developing new directions for development of standards in the field of ITLET.

2. Related work

It is common practice that the first phase of a project specifies clear goals and objectives, as these are identified as critical success factors (CSF), e.g., in implementing enterprise IT projects. Clear goals and objectives form a clear-cut CSF, but can also be rather problematic [3]. Goals are difficult to determine without consideration of the broader context of IT infrastructure. Akkermans and van Helden suggested that on the methodological level this viewpoint is consistent with the concept of IS development that considers "evolutionary complexity" [3].

The success or failure of projects has been linked to the quality and usefulness of the models representing the requirements [4, 5]. Elicitation of goals and objectives from such a complex domain as ITLET, especially in the field of anticipatory standardization, may require methods and skills that often go beyond the 'toolbox' found in many working groups in standardization [6].

Goals and objectives are not the only justification for enabling a project proposal to be accepted. Ideally, the objectives should inform the definition of what is to be specified in the standard. Therefore, the first step is to draft an informal specification of the Universe of Discourse (UoD), in order to inform the formal specification through a modelling and validation process [7]. Two types of experts, whom may be termed domain experts and system analysts, are needed for this work. "Roughly speaking, a domain expert can be characterized as someone with (1) superior detail-knowledge of the UoD but often (2) minor powers of abstraction from that same UoD. The characterisation of a system analyst is the direct opposite" [7]. Where the different areas of expertise meet, natural language is the basis for communication. The domain expert does not need to have any knowledge of formal modelling languages. However, the system analyst should have some abilities to communicate with the "owners" of the problem at hand. Following Frederiks and van der Weide, "the quality of the modeling process is bounded by the quality of concretizing into an informal description augmented with the quality of

abstracting from this description" [7]. Of course, the better tool support (language, models, technologies, etc.) these concretisation and abstraction processes have, the better quality of the resulting requirements documents.

Conversations among domain experts play a critical role in the Committee phase of the process. The international and intercultural settings of such conversations make it even more important to identify the root constructs used to build coherency in a published standard. Sense-making is therefore an important process of standardization, together with design and negotiation [8, 9]. Mason [10] presents a model in which *why*-questioning is viewed as an important instigator of sense-making, particularly for knowledge creation. In this model, a set of primitive questions: *Who, What, When, Where, How*, and *If* work together [10]. A consequence is that without *why*-questions, and their answers explicit, understanding of function is necessarily constrained.

Schoechle has found the 'dramatistic pentad' of Burke useful in understanding standardization discourse, "particularly on the lower technical committee or working group level" [11]. Burke identified five key elements necessary to describe human drama, Act, Scene, Agent, Agency and Purpose [12]. These concepts correspond to the questions of what, where/when, who, how and why. For Burke the concepts in the pentad are strongly interrelated, and:

"Men seek for vocabularies that will be faithful reflections of reality. To this end, they must develop vocabularies that are selections of reality. And any selection of reality must … function as deflection of reality. Insofar as the vocabulary meets the need of reflection, we can say that it has necessary scope." [15]

According to the ISO Directives, scope is only concerned with *what* questions. While this might be the outcome of a well-formed scope statement, however, in order to specify what to standardize, the development of the scope goes through a number of *why*-questioning cycles. The *how* question is informed by the scope, but does not contribute to the specification of the scope.

In addition to literature review this study is based on content analysis of documents in the TC353 and SC36 registries, analysed using a computer assisted qualitative data analysis tool (TAMSanalyzer) for tagging and analysing data in iterative steps.

3. Case studies of rationale and scope in two formal SSBs

3.1 CEN TC353

CEN TC353 was established 2007 and has since produced four European Norms and filed 129 documents in their registry (May 2012). An analysis of all TC353 documents shows that justification of the committee itself is a dominant theme that impacts the standards it produces. The Business Plan's scope is worded as a marketing statement: Developed standards "will have a well-defined European scope", and they are needed because the market is "sufficiently mature to require European specific standards". However, the first published TC353 standard was a rubber stamped ISO standard on quality, adding no European specific technical work, or even no European specific rationale.

CEN uses the same 'new project template' as ISO, but while TC353 may have utilised the template, it has also interpreted it. In a proposal for a new Curriculum

Exchange Format the Scope section is missing. TC353 works closely with a CEN workshop, and therefore much of the technical work may be done when the TC launches a NWI. Therefore, the scope in a 'preparatory document' for a NWI on Learner Mobility reads like a business rationale: "There is a need for European metadata descriptions for LET offers (...) Europe has got a unique complexity of didactics...". When the NWI was presented for balloting, it had a nearly finished specification (from CEN WS-LT). Therefore, the scope on this occasion functions more as a summary of the standard, describing exactly what it is doing, whom should use it, what they get, and what they do not get.

The NWI descriptions of TC353 thus show that delivering a convincing rationale plays a more pivotal role than providing a well-defined scope. 'Scope' and 'Purpose and justification' are mixed up, e.g., as in the proposal for the fourth TC353 standard where the scope reads, "the harmonisation of these efforts is now necessary towards a European solution in order for providers to develop a new generation of technology-enhanced services for learners". Purpose and justification is furthermore spread out in several sections in the proposals, i.e., Outcome, Rationale, Policy relevance, and Market impact.

In summary, document analysis of the TC353 registry shows that argumentation on organisational and policy/market rationale is the focus of activities generating new work items. Formal procedures for structuring documents are therefore adapted. Scope sections are used for justification of the project, and there are few '*what*' statements that could instigate technical discussions at this stage. On the other hand, in some of the proposals an 'Approach' section is found (not part of the 'Form A' template), which directly invites discussions on '*how*' the project should be developed, also technically.

3.2 ISO/IEC JTC 1/SC36

SC36 has been operating since 1999 and has produced 30 standards, more than 2400 committee documents and many thousands of working group documents. Even with a longer practice and a stronger secretariat support, this committee adapts the procedures laid out in templates and Directives. For example, the scope of an e-Textbook standard was introduced by three paragraphs under the subheading of "Context", before stating the scope, which is arguably very general: "[to] specify an information model that will enable interoperability and exchange of learning resources contained within it".

This document analysis is limited to scope statements of all projects, either in process or published. The findings of the European study are replicated. Many justifying statements like the following are common: "this standard is intended to meet the need of learners…", "will support legal requirements", "equal access to education or information", "solve resource sharing and interoperability problem", "will integrate the most relative specifications mentioned above which apply to the field", "ensure that LET environments reflect the specific needs of mobile learners", etc. It can be claimed that these explanatory pieces of text are more directed to audiences outside the development team than to the experts who will design the specification.

Vagueness and internal use of delimitation statements. Scope is supposed to be "a series of statements of fact" [2]. It could be argued that the statement "a quality standard 'complements' another standard, 'which does not have detailed processes'..." is a kind of fact. However, the role of the statement is not delimitation to focus work, but to argue

about rationale. Describing what should be done by characterising what others are not doing is not a particularly effective way to circumference one's project. In this case, the project should produce "a quality framework for both creation and delivery of e-Tests", consisting of "a quality model and a Process reference model". With the term 'e-Test' not defined, the use of computer science constructs like 'information model', 'reference model', and 'framework' do not give the domain expert much direction for their work.

Understanding of the scope hinges upon the use of commonly used or well-defined key concepts describing the subject of the standard. Some SC36 scope statements, however, lack specificity concerning the subject, as if it is internationally common knowledge what is meant by terminology such as "e-Tests", "Proficiency Level Information", "e-Portfolio", "e-Textbook", "e-Schoolbag", etc. If the subjects as such are not defined, one may expect them to be defined indirectly by defining "the aspects covered, thereby indicating the limits of applicability of the document or particular parts of it" as the Directives prescribes [2]. However, stating that the subject (e.g., the e-Textbook), will be described by a "concept model" or "guidance regarding usage" does not actually explicate the aspects covered by the standard.

The scope template accommodates "Exclusions (if any)"; however, it advises against specifying exclusions (which are an endless domain). Nevertheless, in some SC36 scope statements the exclusions are more specific than what is defined in scope. It seems that the role of these statements is not to point to "other existing ISO or IEC technical committee(s)" to help the users of standards browsing the catalogue. Analysis of the documents and participatory observations make it clear that the exclusions in these documents are used to build a case for further standardization work within the same community, often organised as a "project split" (within SC36) but within the Directives described as "subdivision of the subject matter" [2]. It is arguable that the exclusion parts of scope statements in SC36 are used for internal purposes (to keep control of new work within the committee itself), given that no *published* SC36 standards define exclusions.

Scope creep. Evidence shows that SC36 scope statements are sometimes changed during the technical work. The boundaries of what is standardized are moved, both as a result of editorial work and of the comments resolution processes.

How scope statements are developed may provide an indication of the quality of the development process of the standard. Some of the data of this study could be interpreted this way. To expert participants of SC36 some of the projects are known to be severely delayed, causing conflicts in the working groups, etc. A closer look at the scope description of these projects reveals that some scope statements:

- are often verbose (often covering many pages);
- do not clearly describe what the standard does (e.g., "this (multipart) standard identifies and summarizes principles governing (…) requirements which are generic and applies them to the field of learning, education and training";
- include a number of references to standards and policy documents in other domains; and,
- include a number of sections on exclusions, and what is defined out of scope is defined more in detail than what is in scope.

In reviewing the document history of these draft standards it is sometimes evident that the scope is defined at the end of the specification process, which explains the use of a great number of editor's notes arguing for the different alternative wordings.

4. Discussion

These preliminary case-studies of TC353 and SC36 scope statements show that sense-making about scope goes beyond discussing the circumference of the object of standardization. Scope plays a major role in the Design-Sense-making-Negotiation (DSN) cycles [8, 9] of standardization. Applying an Actor-Network theoretical perspective [13], scope serves as an *actant* that could be mobilised in support of one's view. The more diffuse the scope is the more possibilities there are to claim that a position is within or out of scope. It is said that changing scope during a project "wreaks havoc with project timelines and lowers the morale of the development team" [14]. Nevertheless, minutes from Comments Resolution Meetings (CRM) of SC36 show that scope statements often receive comments and are updated on a regular basis throughout projects.

The role scope plays in standardization does not necessarily reflect the role it is given in the Directives. The SSB takes a committee and document management position, where the scope statement plays the dual role of providing a separation of work and an abstract of published work. In the staged development process, there is a time for asking why work should be done, and another time for doing the work. This is why the rationale, the Purpose and Justification section is left behind in the NWI proposal, and not included in the standard document.

4.1 The narrative role of scope

The SC36 case-study shows that statements answering *why* questions do find their way into scope descriptions. To explore why this is happening, interpretive communication studies theory, in particular the Dramatism developed by Burke, have been studied [12]. The dynamics in the amendment of scope statements demonstrated could be interpreted as a strong need to construct a *narrative* that represents the project and is able to enlist support, what Burke calls a "representative anecdote" [12]. In the case of a standard project the representative anecdote is the business case for the standard, which is negotiated and renegotiated, often in discussions on scope. Burke came up with a dramatistic pentad as an instrument to discover how the speaker persuades the audience to accept his view of reality. Positioning the definition of scope in the narrative or a dramatistic perspective brings to the fore the interrelationships between the different questions that constitute standardization discourse. The act, what is to be done, has to take place on a scene, in time and places (when and where). Reduction or expansion of the scope, of what is to be done, can only be discussed with reference to a purpose. If the drama is going to take place, agents have to move with agency, i.e., using means, organisation, commitment and methods.

4.2 The role of explanations in scope statements

In DSN activities, the core processes of standardization, scope is a 'common starting point', a statement that ideally all parties commit to at the outset of a project. The commitment has nothing to do with the acceptance of the encircled entities identified in

the scope, but with the presumption that a partially shared understanding is within reach as part of the normal process. Our data show that in pre-structured documents, narratives make their way into sections reserved for only certain kind of questions. Also, scope statements are found worded as rich explanations. "An explanation is defined as a complex kind of speech act put forward by a proponent in a dialogue to meet a certain type of request made by a respondent" [15]. In explanations why-questions play an important role as *why* is the question that provokes the widest response [10] and is the question that often initiates the dialogue [16]. And, as Hoel and Mason [16] have pointed out, *why*-questioning spans a broad variety of semantics.

If the original intention of the scope statement in a standard is to be maintained, *why* questions related to justification of a claim are 'out of scope".

It is of course debatable whether scope statements are the proper place for the inclusion of explanatory content. Scope, after all, is about stating with precision and clarity what the boundaries of the specification are. But it is also very much the case that explanatory content performs an important role within the standardization life-cycle. While the foregoing discussion has been principally focused on the early stages of standards development there also exist numerous examples within multi-part SC36 standards of "afterthought" parts that are entirely focused on explanations of "how to use Standard ##" [17].

5. Conclusions

The conversational and rhetorical aspects of scope definitions cited in this study (and also implicit in the DSN theory of standardization) pose questions about how standardization processes are managed. It is not possible to exclude *why* questions from the specification process, even if these questions have little "support" from the formal structure of the process, i.e., document templates, Directives, staging, etc. If the value of explanatory content is to be preserved, however, then a placeholder for *rationale* may improve the quality of ITLET standards. It is also arguable that good management is more than sticking to the formalities. Knowing how important discourse on purpose and justification is, a working group chair may make space for discussions of this nature in special seminar like sessions, presentations, national body document contributions, etc. There is a need for further research on processes in the early phases of standardization projects, especially related to requirement elicitation and how requirements will inform the technical work in ITLET standardization.

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