International Journal of Standardization Research
Volume 16 • Issue 2 • July-December 2018

Extensive Quality Model of Semantic Standards

Erwin Folmer, University of Twente and Kadaster, Enschede, Netherlands

ABSTRACT

A problem survey, including 34 semantic standard setting organizations (SSOs), gives the evidence that quality of standards can be improved, but for the improvement of a quality measurement an instrument is needed. The main research question in this work is: What are the characteristics of an instrument to measure the quality of semantic standards that will aid standard developers in improving their standards? The presented quality model consists of in total 100 quality aspects structured within three hierarchical trees; product quality (intrinsic), process quality (the organization of the standard), and quality in practice (application of the standard).

KEYWORDS

Instrument, Interoperability, Quality, Semantic Standards, Standardisation, Standards

INTRODUCTION

Earlier work, based on a survey, has shown that quality of semantic standards, in the information systems domain, is improvable (Folmer, Oude Luttighuis, et al., 2011). The results of that survey indicate that quality is not properly addressed in current standardization practice, and this reduces standards' quality, and therefore interoperability (Folmer, 2012). This work will present a quality model for semantic standards, an instrument that although requested by the developers and owners of semantic standards did not exist upfront (Folmer, Berends, et al., 2010). In other domains, such as product engineering, software engineering, or data, there has been a longstanding history on the topic of quality, resulting in many quality models.

Our comprehensive research process included a vast amount of literature from these domains, and resulted in an earlier published book containing the state of the art (Folmer & Verhoosel, 2011). Amongst other models from Juran, Deming and Crosby (product engineering), ISO 9126 & 25000 and CMM (software engineering), Delone and McLean (Information Systems) and Wand & Wang (Data), have been identified and are being used in our design approach for a quality model of semantic standards.

The design approach consisted of 7 iterations of build and evaluate, and is in full described in (Folmer, 2011; Folmer, 2012). This article will focus on the outcome of the research process, with relative short attention to the problem setting, literature and evaluation of the product.

In this research we focus on semantic information system standards (in short: semantic standards), a relatively new area of standardization. Semantic standards reside at the presentation and application layer of the OSI model (Steinfield, Wigand, Markus, & Minton, 2007). They include business transaction standards, inter-organizational information system (IOS) standards, ontologies, vocabularies, messaging standards, document-based, e-business, horizontal (cross-industry) and vertical industry standards. The often-used examples are RosettaNet for the electro

DOI: 10.4018/IJSR.2018070102

technical industry, HealthLevel7 for the health care domain, HR-XML for the human resources industry and Universal Business Language (UBL) for procurement. Semantic standards are designed to promote communication and coordination among organizations; these standards may address product identification, data definitions, business document layout, and/or business process sequences (adapted from (Steinfield et al., 2007)). Both point to point and hub IT architectures might facilitate this standards-based communication and coordination between organizations (Steinfield, Markus, & Wigand, 2011b).

Löwer (2005) sums up the different terms used for what he calls inter-organizational standards, which to a large extent are synonyms: "Inter-organizational System Standards and Process Innovations", "Open E-Business Standards", "Standards for Domain-Specific Interoperability", "Vertical Industry Languages", "Vertical IS Standards", "XML-Based E-Business Frameworks" and "XML-based E-Business Standards".

When developing a quality model our top goal is defined as "Support semantic SSOs (Standard Setting Organizations) in developing high quality standards" which has been decomposed into three level-two goals, which have been further decomposed and can best be summarized as (Folmer, Krukkert, et al. 2010): Usefulness for different semantic SSOs, efficient to use, and usable end results.

Within the build cycles, explorative case studies have been used related to several semantic standards from different domains, including temporary staffing (Folmer, Van Bekkum, et al., 2011), and education. Also design rules, applicable to many types of IT artifacts, were followed (from (Cavano & McCall, 1978; Gregor, 2006; Morell & Stewart, 1995).

LITERATURE ON SEMANTIC STANDARDS QUALITY

Semantic standards development is different to the development of other standards. For instance, intrinsic motivation is particularly important in the context of a semantic committee (Teichmann, 2010). Intrinsic motivation can be compared to having a hobby in standards development, which impacts motivation and quality.

Two well-known case-studies regarding semantic standards are related to the MISMO and RosettaNet standards, and in both studies traces of the importance of quality can be found. In the search for critical success factors for a RosettaNet IOS project, quality was identified as a critical success factor, in the opinion of respondents: "Thanks to the high quality of RosettaNet standards, the implementation of IOS in Cisco and Xiao Tong was very efficiently carried out and at low cost" (Lu et al., 2006).

Based on the case study of the MISMO standard within the mortgage industry, a proposition has been set up that supposes that the tactics that are used during standards development will influence the quality of the standard, which will, in turn, affect the success of standards diffusion (Markus et al., 2006).

In addition, Markus et al. (2006) state that due to heterogeneous interests it is likely that the standard contains compromises that affect both nature and quality of the standard and makes diffusion more challenging. MISMO shows that the "keep it simple, stupid" approach to promote diffusion is better than a perfectly designed technical standard. Based on the same case, currently unanswered quality related questions are raised (Markus et al., 2006):

1. Do semantic standards initiatives re-invent the wheel? Or are they borrowing from other initiatives?
2. Are there problems created in the area of cross-sector interoperability by sector initiatives?
3. What is the (diffusion) effect of the fact that semantic standards are developed by many different organizations?

Motives for Participation in Formal Standardisation Processes for Geographic Information: An Empirical Study in Sweden

Jonas Lundstenand Jesper Mayntz Paasch (2017). *International Journal of Standardization Research (pp. 16-28).*

www.irma-international.org/article/motives-for-participation-in-formal-standardisation-processes-for-geographic-information/192139