Report on Activities of ISO/TC 184/SC 5/OPM SG
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Summary of Project Activities since 2010 SC 5 Plenary Meeting

There are two broad activities outlined in the SC5 OPM Study Group Terms of Reference. Objectives 1, 2, and 5 have to do with the development of standards and OPM's utility in that effort. The first years effort based upon IEC 62264 is expanded to include efforts with ISO 19440 and ISO/IEC 19782 as existing standards to which OPM is applied. We group these objectives as Activity A. Work on these issues is presented in Section 3 of the Interim Report. Primary contributors to this section of the report are Dov Dori, Alex Blekhman, David Shorter, James Brucato, Chen Linchevski, and Richard Martin.

Objectives 1, 3, and 4 have to do with an evaluation of OPM as a modelling tool for SC5 use throughout the range of standard development and interoperation assessment that is the work of SC5 participants. Work on these objectives is presented in Section 4 of the Interim Report. Primary contributors to this section of the report are David Shorter, Richard Martin and Dov Dori.

A third activity involves the generation of an OPM model that is a Meta-standard for Model-based Standards Authoring as called for in SC5 Resolution 624. This work is based upon an original OPM effort by David Howes, which was revised and extended by Richard Martin, David Shorter and Chen Linchevski. The working draft document and subsequent model revision are the work of Dov, Dori and Alex Blekhman. This work is briefly reported in Section 5 and fully expressed in SC5 N1112.

The OPM SG 2nd Interim Report, SC5 N1111, details the results of all of these activities since the last Plenary in 2010.

Conclusions from Activity A – Objectives 1, 2, and 5

Conclusions specific to IEC 62264, ISO 19440, and ISO/IEC 19782 as analyzed by the ISO TC184/SC5 OPM SG include:

- OPM offers a modelling methodology that can be applied to a wide variety of SC5 and other ISO and IEC standards to help understand their content.

- While OPM models of specific clauses may assist in identifying inconsistencies within or between standards, there seems to be little benefit from the extraordinary amount of effort required to produce OPM models for the entire standard. Sentence structure and sub-clause phrasing are often more complex as natural language than can be concisely expressed in the restricted language of a modelling methodology.

- For the most part these exemplar standards specify information models rather than process or procedural models. Therefore, the process oriented OPM approach is of less utility because the 'object' only use of OPM produces much weaker correspondence to the clause structure of information only standards.

- This work indicates the viability and benefits of using a modelling language in general and OPM in particular to significantly improve the quality and the value of standards. Using OPM does identify opportunities for improvement in each of the standards. However, it is not clear whether the realization of improvement opportunity is the result of OPM use per se or the result of the modelling effort undertaken to utilize OPM. A significant aspect of this result is that OPM can be used to sketch the implementation of the information oriented standard and this sketching identifies weaknesses in the standard itself.

- Even when a standard exists, different experts will model the same text as sometimes substantially different models. This would imply that adopters of a standard will also comply with the standard in different ways. Therefore, a significant advantage for a model-based standard should be a uniformity of compliance based upon the model for which the model-based text becomes elaborated by further explanation of the specification. In this regard, consistency and completeness is necessary for the model-based standard to be of sufficient quality to allow uniform compliance.

- With the extent of inconsistencies that have been identified concerning the examination of the example standards, it is not likely the OPM snippets can fully resolve or even identify all of the potential compliance issues that might arise. For the very detailed specification of ISO/IEC 19782, compliance is much more straight-forward than for IEC 62264, which provides many isolated compliance points. ISO 19440, which is a standard for modelling constructs, may be implemented in many different ways, all of which could be in compliance.

- In the case of all three of the example standards, domain expertise is critical to the preparation of a satisfactory OPM model. Transposing the normative text into an OPM model with generate OPL that can be rearranged to parity the normative text is insufficient. Domain specific ontology and practice are implied qualities of a standard that cannot always be overcome.

Conclusions from Activity B – Objectives 1, 3, and 4

To determine the usefulness of OPM, we examined four significant areas of concern: fitness for use, gaining acceptance, availability and stability, and operational management. During this past year as our work with OPM escalated, we were able to resolve a few of the previously identified issues and verify the extent of other concerns. More specifically we find evidence that:

- OPM is on the surface a straightforward language to learn. But as with any modelling language, the nuance of use can be much more difficult as design and implementation choices of a tool impose further restrictions on language use.

- As a methodology OPM advocates top-down refinement beginning at the central process in the System Diagram. This approach aligns well with the way enterprise and device standards are structured beginning with a statement of scope. But seldom do we actually develop a standard from the top down once a scope is determined. Our work effort is most often middle out or even bottom up. And while OPM does promote the creation of model snippets or fragments, integrating those pieces into a uniformly presented model can be very difficult, just as it is in crafting the normative text in the manner to which we are already accustomed.

- The learning curve for OPM itself is not steep. The concepts are few in number. But because of the power that any set of simple concepts provide, using them well in a wide variety of situations is far more difficult. It will be especially difficult for ISO experts not familiar with graphical modelling sets to grasp the effective use of those concepts. For those crafting the information-oriented standards where process explication is minimal or non-existent, UML or XML will be a more natural choice for expressing the information model.

- We have seen no evidence that the Tesperanto language effort associated with OPM has made much progress over the past year and it is still necessary to restate the Object-Process Language

result of Object-Process Models into natural language text that meets the style and usage criteria of the ISO CS editors. While the formal underpinning of OPM assures the integrity of the OPL statements, their translation into natural language can violate that formal basis. Of particular concern is language associated with the normative text were the lack of a suitable deontic OPM syntax can lead to incorrect or inadequate normative expressions. .

- It is clear that the bi-modal expression resulting from OPM could be beneficial to those developing a standard. Previously an examination of some other potential modelling languages for use in the same manner indicated their deficiencies with respect to OPM. In particular the nesting of concepts and a simple yet complete syntactic structure make OPM stand out.

- While we have managed to get a version of the OPM OPCAT tool working in the Apple environment, it was not straight-forward. The availability of satisfactory technical assistance for a large group of standards developers appears unlikely without much more market uptake of the OPCAT product. Without some competitive sources of tooling, OPM is a single supplier product that is not suitable for wide spread use.

- The formal specification of OPM and OPL as a Technical Report could spur uptake by other tool vendors and allow wider use opportunity. The basic product is satisfactory for our investigations but hardly suitable for more sustained efforts by the developers of new standards on an ISO timeline unless they were already conversant with the OPCAT tool and had available specific guidance for use in the ISO context.

- Operational management remains a concern. In a disciplined design and development environment the OPCAT collaboration facilities may be adequate but in the less constrained and widely divergent environment of ISO working groups that same extent of collaboration is insufficient. ISO experts are essentially volunteers, often working on their own time or constrained by other duties. They work independently with collaboration points occurring at the time of comment resolution. It is difficult to imagine how a ballot comment consisting of several different OPM snippet proposals could or should be resolved. Even simple UML models can take several sessions to resolve.

- The integration of model fragments upon which OPM depends for model consistency checking will be a management issue for large systems; however we note this problem exists with all current modelling paradigms. It will be especially important to identify the means and mechanisms for OPM model maintenance over revisions and amendments to a standard.

    Finally, we have assembled in Annex B a list of OPCAT tool features that seem awkward or insufficient for large scale SC5 OPM use.

Conclusions from Activity C – Meta-standard for Model-based Standards Authoring

There are two portions to this activity. The first began as an effort to model the current ISO standard development process from inception of a concept for a standard through its balloting stages to final publication and identify where the model-based aspect of standardization fit into that process. The second portion was to take the processes that touched upon the model-based aspects and elaborate the model generation processes.

The first portion resulted in a fully executable OPM model Model-based ISO Standard Authoring – Final.opx that moves a document from concept through each of the ISO stages of balloting to final publication. The purpose of this model is to document, for those not already familiar with the ISO processes, the manner in which a document is managed and, for those already familiar with the process, the use of OPM with simulation to model a complex process with which they were familiar.

The second portion resulted in the preparation of the Model-base Standards Authoring – Final.opx OPM model and Meta-standard for model-base standards authoring working draft. Using the first portion to identify touch points, this model elaborates model-based aspects of standard's authoring.

Promotional Activities since 2010 SC 5 Plenary Meeting

Needed Action by SC 5

Recommendations

This report presents what has been achieved and demonstrates the promise and applicability of OPM for supporting the analysis and drafting of enterprise standards. This report also identifies significant impediments for OPM, or any other modelling paradigm, to manage the complex tasks involved in the development, publishing and use of International Standards. The Study Group recommends that ISO TC184 SC5:

(i) Endorse the work carried out by the OPM Study Group over the past year;

(ii) Continue the development of the WD for a Meta-standard for Model-based Standards Authoring as guidance for working groups to use in applying OPM to their projects with specific emphasis on the benefit of rigor supplied by the OPM models addressing consistency and completeness of the standards resulting from its application, and on the limitations of the OPM approach to the creation of SC5 standards products;

(iii) Continue the effort to examine the use of OPM as an aid in the harmonization of IEC 62264 and ISO 19440 to produce a more robust standard for use by industrial enterprises that leverages the strengths of each approach and validates the guidance of the Meta-standard for Model-based Standards Authoring.

(iv) Prepare a first draft of a formal definition of OPM as an ISO Technical Report to serve as the basis for model-based standards authoring and evolution.

(v) Create a proposal for a new SC5 Working Group to promulgate the Study Group efforts over the anticipated standards development interval.

Historical and Future Meeting Schedule

Four OPM SG participants met at NEMA in August 2010 as part of the TC184/SC5/WG1 meeting for two days to work on activities identified in SC5 Resolution 624 and in Tampa co-locating with the SC5 Plenary to work on revisions to N1112 working draft for Model-based standards authoring document. Other work of the OPM SG has been carried out using informal electronic meetings and email exchanges. No other formal meetings are planned at this time.

Submitted by Richard Martin and Dov Dori
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