Business Process Reference Model Languages: Experiences from BPI Projects

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Abstract: Natural Language is not appropriate for reference models because it risks being an in-complete, unstructured and inconsistent form of representation. This paper presents insights into a qualitative study examining both textual descriptions and semi-formal models based on ITIL. The conclusion is that a hybrid approach of models and textual extended explanations and definitions is the best approach to depicting business process reference models.

1   Introduction

Reference Models are one way of storing and reusing knowledge about a given domain. They depict the common characteristics or general structures that can be applied to numerous instances within a class of domains [Be98; Fr99]. Using reference models can reduce the cost and time efforts required for modelling [Sc98]. A prerequisite for realising these benefits is to have a quality reference model [MZ00]. One of the major quality factors in models in general is consistency [LSS94; KLS95; BRU00]. There were two major factors of consistency, consistency in the use of the language and consistency in the content. These factors are also particularly important in the perceptions of business process reference model quality.

In another field much work has been done to improve the process of transforming natural language requirements into formal models that are more suitable for system design e.g. [IBJ02]. Natural language is not ideal for system development because it is prone to being unstructured, having gaps in information and containing inconsistencies [RSP99; Fa00].

Combining these two facts, i.e. that business process reference models need to be consistent and that the use of natural language generates inconsistencies, it is a small step to conclude that natural language is not the most suitable language for a business process reference model. With this conclusion in mind, this research attempts to show the difference in perceived quality between the semi-formal models and natural language descriptions. To operationalise this research, models based on the ITIL (Information Technology Infrastructure Library [Cc00]) reference model were created and both the original

natural language descriptions and the produced models were then provided to teams engaged in 'real-life' consultancy Business Process Improvement (BPI) projects.

This paper is structured into the following sections. Firstly we explain the research method, then present the results of the study before drawing conclusions based on these results.

2 Research Method

The research has three stages. First the design and validation a semi-formal reference model based on ITIL, the second stage was presentation of the model and textual descriptions for use in business process improvement projects, and the third was the survey of the model users after the use of the models.

2.1 Creation of the Semi-Formal Models

ITIL is a best practice framework for IT Service Management, developed in the late 1980's for British government institutions. It has been widely accepted in the UK and is gaining popularity in other western countries [Du02; Ka02]. ITIL (Information Technology Infrastructure Library) is presented in natural language with sporadic use of ad-hoc flow-charts and diagrams with no set structure, objects or rules. A major criticism of the ITIL models is the lack of top down guidance on how the processes interact and rely on one another. This lack of comprehensive high-level integration limits the ease of use of ITIL. Perhaps due to the fractured nature of the creation, the multiple authors and inherent complexity of the domain, it is frequently inconsistent in both content and depiction. Semi-formal models were derived from the textual description using the eEPC (extend Event-Driven Processes Chains) and value chain techniques. The model creation was completed by a modeller who had reasonable modelling experience, was currently employed as a process modeller and had reasonable knowledge of the domain through extensive research and contact with IT services providers. The content of the model was largely drawn from the ITIL Service Support book and the higher level models also included comment from 8 organisations currently providing IT services in outsourcing arrangements (including 4 of the top 10 provides by revenue in Australia). The development of the semi-formal models was limited to Incident Management. A total of 7 models with over 150 objects and several sub-models were made available dealing with the incident management process.

2.2 Using the reference models

Two BPI projects were conducted with industry partners in collaboration with the Queensland University of Technology. In the first half of 2003 these projects were conducted in the area of IT Service Support specifically Incident Management. The BPI methodology used was that of the Business Process Lifecycle [Ro00], which includes the steps Process Identification, AS-IS Modelling, Process Analysis, TO-BE Modelling,

Process Implementation, Process Execution and Process Monitoring. Postgraduate IT student teams were given 13 weeks to suggest improvements to the processes effectively reaching the end of the TO-BE modelling activity [RSS00]. The models were presented in html format, after being produced in the ARIS toolset. Students were given access to both the ITIL books and the ARIS model.

2.3   Data Collection

Data about the use, perceived quality and consistency of both the books and the models was collected from the project team members via surveys. Questions focused on drawing comparisons between the original ITIL books (books) and the ARIS models (models). After preliminary demographic information on modelling and domain background, the respondents were asked to identify how both the models and books were used in the project (e.g. for process identification, AS-IS modelling template etc). The survey went on to ask for possible improvements in both the books and models in free text questions and finished with a direct comparison between the models and the books on a five point scale in relation to given statements (e.g. contained more ambiguities, limited creativity etc). The topics of these comparisons were drawn in part from [Sc98] work identifying the impact of reference model use.

3   Results

The most interesting finding from the survey was the total number of uses for the books versus the models. The models were reportedly used in twice as many times than the books (18 reports in comparison to 9).This was not reflected however in the response to the direct comparison, "Which did you use most?" in which the response favoured of the books.

Models were also consistently perceived as easier to read and as providing a better over-view than the books and as allowing better semantic quality of the models produced during the projects (i.e. TO-BE and AS-IS). The models allowed better opportunity to check the syntactical quality of the models produced in the projects by providing an example for comparison. There was a positive reaction to the models compared with the books when asked which source contained ideas that could most easily be incorporated into the TO-BE models.

Sample results are provided in Table 1. All respondents confirmed that the models added value to the books, and all indicated that in a future project they would use *both* the books and the models.

Examination of the resultant AS-IS and TO-BE models from the project teams showed a high degree of similarity to the reference model. In fact all the value chains were identical to the reference model and many of the object names and decision points in the eEPCs were similar, if not the same those proposed in the reference model.

Question	St dev	Average Rating				
(5 respondents)		Books			Models	
Which gave the best overview?	0.7				x	
Which one was easier to understand?	0.8				x	
Which was more precise?	1.3			x		
The time spent understanding which material was not worth the benefits gained?	1.1		x			
Which allowed semantic errors to be detected in the AS-IS models?	1.2				x	
Which allowed syntactical errors to be detected in the AS-IS models.	1.2				x	
Ideas from which material can be easily incorporated into the TO-BE?	0.8				x	

Table 1: Sample Results

4 Discussion

It is clear from the data briefly presented in the previous section that the response to using a semi-formal language was positive. In direct comparison on different aspects the response was mixed although generally in favour of the models. On the question of consistency of the two forms of the material, responses were conflicting. One reason for the high use of an artefact could be its poor quality, lack of conciseness or lack of accessibility, as it may need to be consulted more often for the meaning to be derived. This could explain the answer to the question testing the relative usage of the models and books. Another explanation why the books were used more than the models was the scope of content. While the books included process descriptions, business benefits and implementation guidelines, the models' scope was strictly limited to the processes.

Several of the free text responses perhaps best summed up the feeling toward the two forms of the reference model. The books were considered the most comprehensive source although overloaded with information, and the information was not easily understood nor immediately helpful. The higher use of the books over the models could be explained by the time needed to find and understand the material in the books. The models provided easily and quickly understandable content, but failed to have adequate and sufficiently comprehensive explanations and descriptions when clarification or deeper understanding was required. A solution to this could be a hybrid approach, with semi-formal models complemented by extended descriptions and definitions. This would combine the ease of use of the models, yet still provide the opportunity for deeper understanding of the domain. Using the models as an entry point for the text could be the most appropriate method. This could be operationalised by providing 'bookmarks' on the models allowing users to click through to the appropriate parts of the textual descriptions.

This research has obvious limitations, including the sample and sample size and the fact that only a part of a reference model of a single reference model was used. Despite this, it gives an indication for future work which could include larger samples or determining the optimal combination of textual descriptions and graphical models for business process reference models and the cost benefit of supplementing existing reference models with semi-formal depictions.

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