Towards Quality in Situational Method Engineering

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Abstract
The use of situational methods is a practice that became widespread for some time in the scientific and the industrial sector. The use of these practices represents many advantages, however, the advent of this approach is due to problems encountered by conventional methods of application in particular contexts. This does not preclude that some points remain to be defined and / or resolve to optimize the effective use of these practices.

One of the most important practices is the notion of quality that can ensure proper application of situational methods.

Keywords: Quality, Method Quality, Situational Methods, SME.
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Abstract

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1.0 Introduction

Indeed, in some specific context of work, we can solve a methodological problem by proposing a variety of methodological approaches that can meet our expectations. However there is an effective and well defined to ensure the right choice of a brick methodological compared to others. And that to provide a result which must be consistent and satisfactory when applied in a real work.

Of course, the experience of the architect of the Information Systems influences and plays a role in the choice of components, both through their selection and in their composition. Nevertheless, it is necessary to offer an effective and well-justified any architect to ensure the best choice of elements that form the final method.

To answer this question, our proposal to find an effective, generalizable and applicable to most, if not all, of the composition process of situational methods.

For this, we will suggest an extension of the model that manages the lifecycle of composition / decomposition methods [0]. Subsequently, we will also define metrics and evaluation criteria applicable in this context, and which ensure the quantification and measurement of quality that we need/can achieve from choices made previously.
2.0 Related Work

Methods generally have functional requirements (FR) and non-functional requirements (NFR). Regarding situational methods, we focus more on non-functional requirements as functional requirements. Thus we guide our choices, for example by the ability to manage a large team, or team’s flexibility of responsiveness to change.

Few are the approaches that have addressed the notion of quality methods. Most papers talk about the evaluation process especially during the selection of method fragments [5](chunks [6], components [7], OPF fragments [8] or method services [9] in other papers) to construct a situational method.

To date, the only ones talking about the quality is [10]. Indeed in [10], they propose a concept called “Method Tactics”. This concept can be applied to a piece existing method, a collection of pieces of the method, or an entire method.

While some tactics may be treated as pieces of the method, the tactic is generally defined as constraints on one or more pieces of method.

This approach complements existing approaches for engineering method which rely heavily on the song selection method from a repository of method.

The objective here was to identify techniques that an engineer can use method to improve the quality non-functional.

Subsequently, a preliminary list of tactics has been established.

The first criticism can be made is that the analysis of the tactics they are using is made of informal factors and thus should be considered as general analyzes.

Other critical that we can cite is that the list of tactics may seem arbitrary in terms of their orthogonality and level of abstraction.

Tactics of the method could be organized around their influence on these parameters. But the list may omit some important types of tactics, especially those used in other areas of methods.

3.0 Our Approach

3.1 Defining the world of method quality

In the world of methods, we are interested in defining methods, the notion of quality and the process that allows us to bring out a method from an existing or from scratch.
Various definitions of methods have been proposed [Brinkkemper, 1990], [Prakash, 1994], [Wynekoop, 1993], [Lyytinen, 1989] and the main ideas converge on the principle that a method is based on a set of models and consist of a number of steps that must / should be run in a well defined order.

According to Seligmann, a method is characterized by four main ways:

- The way of Thinking: describe the visions of a methodology. (the paradigm)
- The way of Modelling: describe models used throughout the development process. (the model)
- The way of Supporting: describe the support for techniques able to represent the models (Support Tools)
- The way of Organizing: describe the concept of life cycle. The way of Organizing can be subdivided into:
  - The way of Working: how the work is organized. (the process)
  - The way of Control (how): describe the management of the information system development process and its products.

And as defined by Grady Booch, a method is "a rigorous process to generate a set of models that describe various aspects of software being built using a certain well-defined notation."

Therefore we can see that a method is characterized by two elements. The first element is a process that describes the procedure (the approach). The second one is described by a set of templates that defines the product that we want to achieve.

On the other hand, a method can be categorized into one of these categories:

- The category of methods that are validated in all situations (even if they do not fully meet expectations);
- The category of methods applicable to specific situations; and finally:
- The category of configurable methods for a specific situation

According the all these aspects, we may say that the notion of quality is very complex to implement. It is the convergence of three axes: the product axis, the process axis and the tools axis.

We notice that the notion of quality is relative to the methods applied. Consequently, it depends on the context in which the method is applied but also it is in inference with the terms of use of the method and how user drives method to achieve his goal. That’s why we can find subsequently two kinds of methods. We have identified some methods that are well defined in terms of product and process components but not properly used. These methods represent the category of “well done worst used” methods (or wedwu methods). And we have identified also some methods that are
used in different projects but that are poorly designed. These methods represent the category of “worst done well used” (or wodwu methods).

This distinction increases the complexity of identifying elements to establish quality in methods.

Therefore, we can define method quality in two ways:

- It is a satisfaction contract from the use of the method resulting.
- But also by a ratio to determine between a set of criteria to establish, their appropriateness and the expectations expressed by the method designers and the end-users of the method.

### 3.2 Our Approach

After defining the world of our subject, we have opted for the enrichment of the map proposed by Rolland / Ralyté / Deneckere [0] on the model definition the process of assembling of situational methods.

The assembly process model and the extended model are illustrated in the figure [1] and [2] using the MAP formalism [0].

Intentional modelling of the assembly process model provides a generic model. This model is based on intentions and strategies. The map is presented as a graph where nodes are the intentions and where the arcs are the strategies. Oriented nature of the graph shows that the intentions may have a meaning. The map is capable of representing the many different ways that can be used to achieve an intention. The map includes two predetermined intentions: "Start" and "Stop", which in turn means the beginning and the end of the process.

An important concept in the process maps is “section”. Sections represent the knowledge. They are represented by the triplet <intention source, strategy, target intention>.

In the figure below, the basic components of the assembly process model are presented in the figure [1], and components proposed to extend the basic approach are in red surrounded by bolded lines in the figure [2]. These maps are described in the following sections.

First, we present the basic assembly process map, then the extension.
Figure 1. The initial map of the construction of methods.

The original map provides different ways of selecting fragments of methods that correspond to initial requirements as well as the strategies for their assembly. The achievement of the intention "select fragments of method" resulting in the selection of fragments corresponding to the requirements previously expressed. The intention "assemble fragments of the method" is satisfied when the selected fragments are assembled in a coherent way by the intermediary of the integration and the association strategies. The choice of strategy depends on the presence or not of overlap between the fragments to assemble by their measures of similarity to provide a comparison of the fragments before they are assembled. This will help to choose the right strategy from the strategy of integration and the association strategy.

In the following paragraphs, we describe the extension we made to the original map. Our extension of the model provides mainly two intentions in addition to the initial process map.
The first step comes right after the definition of the objectives of the construction method in “Specify method requirements” intention to enrich its objectives by providing the definition required for the quality characterization of the different methodological fragments of the final method.

In order to ensure that valuation of the choices, we have defined set of criteria for qualification and validation cited in table [1]. This list is not exhaustive and is expected to be enriched.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Possible values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistency</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Fiability</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Cohesion</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Complexity</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Composability</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Reusability</td>
<td>{yes,no}</td>
</tr>
<tr>
<td>Functional capability</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Ease of use</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Extensibility</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Completeness</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Tools support</td>
<td>{yes,no}</td>
</tr>
<tr>
<td>Documentation</td>
<td>{yes,no}</td>
</tr>
<tr>
<td>Coverage</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Scalability</td>
<td>{low, normal, high}</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>{yes,no}</td>
</tr>
<tr>
<td>Specific needs</td>
<td>{yes,no}</td>
</tr>
<tr>
<td>End user implication</td>
<td>{low, normal, high}</td>
</tr>
</tbody>
</table>

Table 1. Set of criteria for qualification and validation
The second step is located at the construction of the method and the end of the process. This is due to a concern with evaluation and validation of the initial decisions.

That being said, we should not forget the changes made to the construction phase of the method to enrich this construction by the rules defined in the previous steps.

The improvement we have made during this step (figure [3]), targeting quality parameters, is based on a Bayesian/Inference network [0] which is used at the decision aid as well.

![Causal structure of the model for decision making.]

We define for each criterion the quantification in relation to its possible values and that to determine whether we will choose this methodological fragment during construction of our method or not. The table [2] below shows the manner in which this decision is made.

<table>
<thead>
<tr>
<th>Validation Criterion</th>
<th>Method architect experience</th>
<th>Value #1</th>
<th>Possible values</th>
<th>Value #2</th>
<th>Possible values</th>
<th>Value #3</th>
<th>Possible values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go</td>
<td>Low</td>
<td>x(v1)</td>
<td>(100-x)%</td>
<td>y(v1)</td>
<td>(100-y)%</td>
<td>z(v1)</td>
<td>(100-z)%</td>
</tr>
<tr>
<td>No Go</td>
<td>(100-x)%</td>
<td>(100-y)%</td>
<td>(100-z)%</td>
<td>(100-x)%</td>
<td>(100-y)%</td>
<td>(100-z)%</td>
<td>(100-x)%</td>
</tr>
</tbody>
</table>

Table 2. Table of the probabilistic parameters of dependence.

4 Conclusion and future work

Just like software, a method has to be designed to satisfy situational requirements including both NFR and FR.
In this paper, we propose the concept of quality of the method and we have defined with the way we understand the meaning of quality methods in the world. This opens a door in the design of new fragments in a more flexible approach. We intend to improve the way in which the operation is performed in decision making for the selection of fragments. We also plan to define and include more criteria to meet the maximum requirements which may be expressed during the initial phases of the construction process.

References


