A NASA Focus on Software Reuse

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PROCESS REUSE - RHYTHMS AND REASONS

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Abstract

There is a need to research the possibility of reusing processes in a systematic way. This paper outlines some of the guidelines to process reuse and presents some approaches to better represent and manipulate processes for reuse.

This paper acknowledges that there are different views of process reuse and that a systematic approach is needed. It justifies the need for reusing processes and discusses three main themes: unified or systematic process reuse, a way to represent processes, a mechanism for storing and retrieving them, and a paradigm for manipulating and adapting process descriptions to fit users' needs.

1.0 Introduction

There is a need not only to address the issue of process reuse, but to research its possibilities and provide solutions that can result in a wide spread practice. Process reuse is a way to increase the performance of companies or organizations, especially those involved in software production. This brief position paper addresses some of the issues that we consider necessary to move process reuse from an ad hoc practice into a more systematic discipline.

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We want to point out that there is no conceptual difference between software process reuse and software process reuse. Only if we could package both the same way, that is, the problem is in representing and manipulating processes in a way they can be handled as reusable assets. Although simple in concept, it is hard in practice.

With processes, we are dealing mainly with information in peoples heads: their experience in performing an activity. The first problem is how to capture that experience into some model or representation. Second, how to determine what information is relevant to reuse, that is, separating the particular from the general (i.e., abstraction) so that we can reuse the general. The third problem is packaging that information for storage and retrieval in a reuse library or repository, and finally, how to adapt and customize the processes for reuse.

In this position we try to provide a basis for discussing these issues. The following sections describe what is process reuse, why we think it is important, and how we think it can be done.

2.0 Process Reuse: What?

Informal (i.e., ad hoc) process reuse is practiced widely. Both the ISO 9000 and its CMM and SEI certifications, for example, require certain ability to reuse defined and well-articulated processes. ISO 9000 is mainly about defining a process scheme that ensures that a company satisfies its own goals and that it produces high-quality products. CMM level 2 indicates the understanding of hidden processes of a firm and the further levels try to define them (level 3), handle them separately (level 4) and make them work more efficiently (level 5). The CMM's personal Software Process (PSP) focuses on an Object-Oriented approach and how to improve and reuse the usual processes.

The relevance of handling processes is described in several recent books on process reengineering, such as the Jacksonian (11). Some of them also propose retention for representing and avoiding processes. Jacksons Object-Oriented approach by means of UML (UML) is one example.

However, all these approaches lack a clear statement on the relevance of handling processes as important and valuable assets for a company. It has been shown that developing techniques for handling processes as assets in particular of reusable assets. We start by introducing a definition for process reuse.

Process reuse is the ability of a company to describe formally the processes together with their relevant properties to store such descriptions in a suitable library and to reuse such processes whenever required, with the needed adjustments.

The words in italics are the core part of this research. Among all open issues (and everything is an open issue now), the way processes are described, the selection of what properties are really significant for them and for the purposes of process reuse, the mechanisms of storing and retrieving the suitable process and the procedure to optimize and/or to adapt the processes to the new scenario are the core parts of this investigation.

3.0 Process Reuse: Why?

Process reuse is helpful for many reasons, which can be divided into two classes:

(a) personal workers' improvements,
(b) company wide processes' improvements.

Process reuse requires people to think and rationalize their practices, so that people get a deeper understanding of what they do and how they work, ramping up the learning curve.

Companies get the beneficial effects from process reuse by the fact that on one side they get a higher control of their operations so that they can more effectively apply the processes, and on the other side they make explicit a database of their key practices that the expertise becomes a valuable and tangible asset of a company which does not get lost when employee turnover.

Process reuse is especially important for software companies. Software companies with more than 200 employees need guidelines for their employees to handle the turnover. The ability to codify the key activities and procedures can be very helpful.

4.0 Process Reuse: How?

To be able to reuse software processes, it is necessary to:

1. Identify a mean to represent the processes and their relevant characteristics,
2. Devise a strategy for storing and retrieving process descriptions from a database,
3. Define a paradigm to manipulate process description for adapting and optimising them for reuse.
by Based Casing methodology [4]. The optimization of the processes it performs on the basis of Activity Based Costing and Value Case Analysis [3]. The example of
revenue mechanism is blamed on techniques borrowed from Case Based Reasoning.

4.1 Process Representation
Use Cases are well suited to represent scenarios. Therefore they seem the most
promising tool to identify and describe business processes for reuse. They had
however, a structured approach to describe the internal part of each process. In all
cases they do not offer a mechanism to identify what is the relevant information and
should be kept for further analysis. Cost, be a key attribute for deciding
on the reliability of a process.

A clear description of objects in Use Cases can be obtained by using a standard
"hierarchy-based" description such as the one for OMT. Thus, once a generic
description in terms of objects has been defined, it is possible to build hierarchies
identifying similarities and differences. In addition, each object in the Use Case
representation can be considered as "activity" that use the Activity Based Casing
vocabulary. Taking this approach further, it is possible to couple the enriched the
Case representation with an Activity Based Casing analysis and obtain a description
of the resources spent in the process.

To get a full view of the objects, it is then necessary to give the role of the
people associated with them and of the infrastructure needed to use them.

4.2 Storing and Retrieving Process Descriptions
The process of storing the information about processes is in no way different from
standard software storage. Any mechanism based such as faceted classification will
work fine, provided the significant information has been added, such as those
containing the skills of the people, the infrastructure and the costs.

In terms of retrieving process descriptions, one way could be to use the standard
mechanism based on facets. Process descriptions however, present a more complex
mechanism than describing software artifacts. One source of complexity is identifying
the proper retrieval where a process can be reused. There is a need for something
powerful for retrieving the right process. We are analyzing the possibility of
building an inference mechanism based on Case Base Systems.

4.3 Process Manipulation
Having a proper process description available, allows users to select and validate
more candidates that can be used as is or modified. The modification of the
features of a process description is rather trivial and can be directed by standard
methods that can help in revising potential bottlenecks, dead-ends, and so on. Now,

ever is it much more interesting to go deeper and to perform a value cost analysis on
the different activities considering the desired process.

By mean of the value cost analysis the user can go deeper and calibrate the existing
process to his/her own need, both in term of removing inefficient people allocation
and determining the desired quality of the outcome.

Moreover also in this case techniques from Case Based System can be used.

5.0 Conclusions

From this position, the potentials of process reuse are evident. However, only
though concrete application it is possible to determine the real value of this
methodology. Therefore the authors aim at developing a system with all the needed
functionalities present but not entirely automated, to assess the effectiveness of the
approach. Then depending on the ratio of the trials, the system will be upgraded,
revised or discarded.

References

1. J. Jacobson, BPR with Object Technologies, Addison Wesley, 1996
2. L. A. Krajewski and L. P. Ritzman, Operation Management, Strategy and Analy-
sis, Addison-Wesley. 1993
3. S. Nickell, The performance of companies: the relationship between the external