

# Constructing a Project Model and a Metadata Model for Experience Extraction

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## Abstract

The paper proposed a project model and an experience metadata model to keep project experiences for software re-engineering. The experiences could be any production in the project process. In a software project, many phases and activities will be gone through and many artefacts will be generated. Properly organizing these resources for being reused can facilitate software re-engineering. However, in the past, the metadata schema for describing experience has not been defined and that made the resource difficult to store in a unit format for public searching and reusing. The goal of this paper is to proposed a way of keep all related project experiences in an experience web and to develop a metadata model for describing project experiences. This metadata model should be able to cover most of the possible products in a project. The metadata model outline in this paper is for constructing a reusable resource repository. Metadata stores in this repository can be employed to retrieve. Once an experience is used and re-engineered, a feedback will be given as a new experience. Consequently, an experience web can be established for later users. The user retrieving can therefore get different views from previous works.

Keywords: experience web, project model, project experience metadata, software re-engineering.

## Introduction

With the increasing complexity of software requirements, how to reuse existing resources of executed project is an important issue. Upon the model of a project usage, in each phase of the model, a project will contain a lot of productions, such as reports, analysis and design documents, experience notes, or the codes of the system. All of those are essential resources that could facilitate a new project. In a way, a new project schedule could be shortened if the resources and experiences are kept and utilized properly. The similar idea was proposed by Basili (2002) who stated that the experience factory could be built to benefit software processes. However, at the current stage, there is no single experience metadata that can cover every phase of a project. Under those circumstances, providers don't know what they should describe for their efforts, and inquirers don't know what they should ask for. The concept of above problem is shown in Figure 1. In view of this, this paper proposed an experience metadata model to give a guideline for software engineers to describe their experiences. The experience provider can be the project manager, the system analyst, the system engineer, the system architecture, or even the developer. This metadata model is designed to support a project model stated in this paper, and it can save the productions of any phase in a project. This project model can be expanded into a project experience web by linking all related experiences together. The inquirer can find all the similar and the most suitable experiences in the repository at once. This paper will first describe the project model. The project experience web formed by this project model will be explained later. The metadata model designed for this project model will be listed as well. Finally, a discussion and a conclusion will be given at the very end.

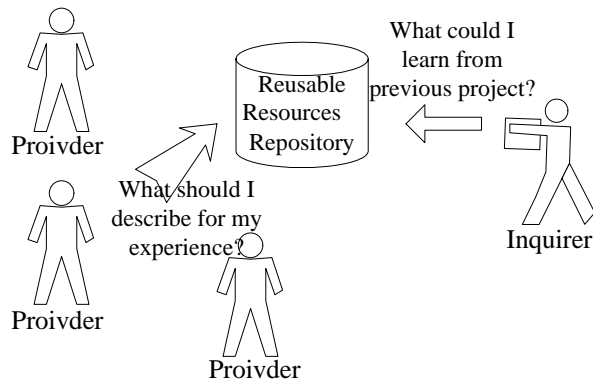


Figure 1. Problems between inquirers and experience providers

## Project Model

The project model in this paper can describe the activities and the products of each phase. The basic components of a project phase are shown in Figure 2. It presents the linkage of each phase and the possible outcomes.

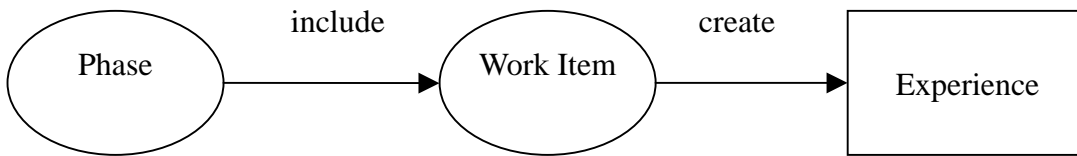


Figure 2. The basic items of a project model

Figure 3 is an example for an analysis phase of a project. The project contains a work item named management planning. The work item creates several tasks such as staff management, budget reports, and so on. Each phase of the project can be linked together and, at the same time, form a project experience set. If a part of the experiences are referred from other projects, it becomes an experience web. The concept of the experience web can be seen from Figure 4.

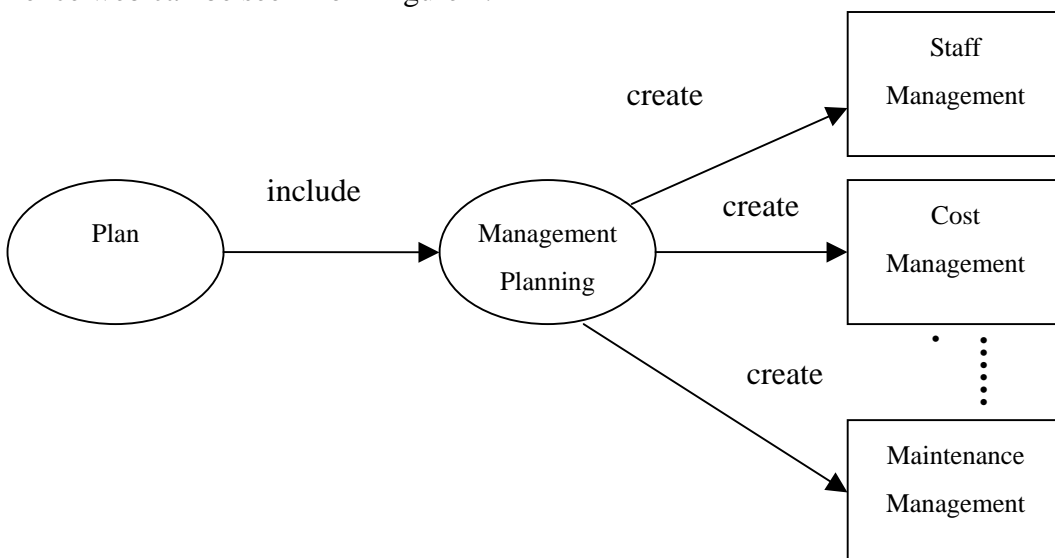


Figure 3. Example of plan phase of a project

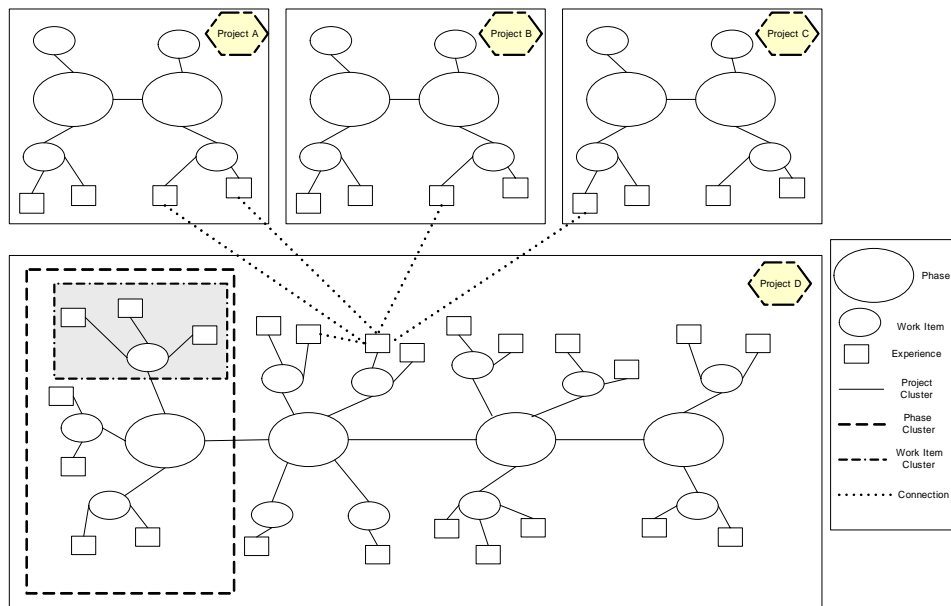


Figure 4. The Complete project model of a reengineering project

### Experience Metadata Model

The suggestions of Sommerville (1992), Jacobson et al. (1999), Jeffery et al. (2002), Dennis et al. (2002), Tracz (1995), Houdek & Kempter (1997), Geppert et al. (1998), Vitharana et al. (2003), Boehm (1981, 1988), PERT & CPM, Rook (1984), Boehm & DeMarco(1997), Nordberg (2003), Buckle (1977), Buckley (1993), Berlack (1991), McDonald (2002) were taken into account to construct this metadata model. This model contains 8 modules, which are named as “Experience”, “Project-related Information”, “Related Experience Information”, “Experience Information”, “Abstract”, “Provider Information”, “Performance”, and “Extended Information”. The relationships and cardinalities between each module can be seen from Figure 5. Each module will be explained briefly in the following:

#### ◆ Experience

This module is concluded from the SDL pattern of Geppert et al. (1998) and the procedures for identifying the code, documents, and data to be controlled as the product definition from Berlack (1991), the code ownership model of Nordberg (2003). It contains experience ID, name, version, location(URL), experience type, provider ID, and the providing date of this experience.

#### ◆ Project-related Information

This module concludes the ideas of the cost-effectiveness model from Boehm (1981), the software reliability from Rook (1984), the software risk management from Boehm & DeMarco(1997) , the different project lifecycle models of Martin (1990), Sommerville (1992), Boehm (1988), Jacobson et al. (1999), and the project audit from Buckle (1977), Berlack (1991), Buckley (1993), and McDonald(2002). Twenty-two attributes are used in this module, and they are the project name, the project leader, the cost estimation model, the total cost, the staff cost, the capital cost, the duration estimation model, the start date, the finish date, the working day, the development techniques, the life cycle model, ... and so on.

#### ◆ Experience Information

This module uses the arguments of life cycle model of Martin (1990), Sommerville (1992), Boehm (1988), Jacobson (1999), Nordberg (2003) to keep: the phase, the work item, the cost, the working day, the duration, the staff, the ownership, the development cooperation model, and the responsible person of an experience.

◆ **Related Experience Information**

This module takes the suggestions of the Quality Pattern of Houdek & Kempster (1997), the SDL Pattern from Geppert et al. (1998), and the standard of software project audit from Berlack (1991) to keep the related experience ID, the name, the version, the experience type, and the relationship of related experience.

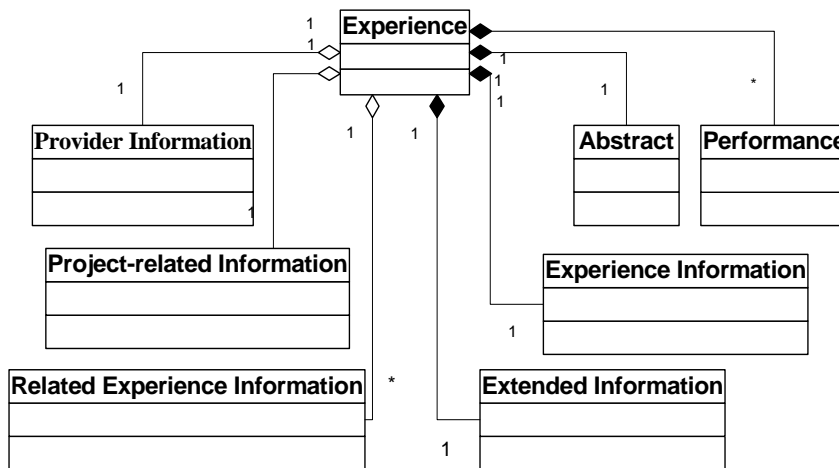


Figure 5. The relationships between each module

◆ **Abstract**

This module concludes the ideas of the 3C model of Tracz (1995), the SDL pattern of Geppert et al. (1998), and the quality pattern of Houdek & Kempster (1997). It has three attributes, namely, intent, context, keyword.

◆ **Performance**

This module idea is coming from the SDL pattern of Geppert et al. (1998) to keep feedback, provider, and date.

◆ **Extended Information**

This module is for keeping any special notes, or different attributes.

◆ **Provider Information**

This module holds the provider information including the user ID, the company of provider and the industry.

**Conclusion and Discussion**

In this paper, the focus was on the importance of managing the experience of a project. We proposed a project model and an experience metadata model to keep exist experiences for s experience retrieval and re-engineering. The metadata model proposed in this paper is concluded from many related researches regarding to software project management. The models have the capability not only to store the experiences but also to keep the experience links and to form an experience web. The repository using this metadata

schema could support the retrieving process by giving an experience web instead of a single reference.

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