Chapter 11
Requirements Engineering Process Improvement and Related Models

Badariah Solemon
Universiti Tenaga Nasional, Malaysia

Shamsul Sahibuddin
Universiti Teknologi Malaysia, Malaysia

Abdul Azim Abd Ghani
Universiti Putra Malaysia, Malaysia

ABSTRACT

Requirements Engineering (RE) is a key discipline in software development, and several standards and models are available to help assess and improve RE processes. However, different standards and models can also help achieve different improvement goals. Thus, organizations are challenged to select these standards and models to best suit their specific context and available resources. This chapter presents a review of selected RE-specific and generic process improvement models that are available in the public domain. The review aims to provide preliminary information that might be needed by organizations in selecting these models. The chapter begins with analyses of how RE maturity is addressed in the Capability Maturity Model Integration (CMMI) for Development. Then, it describes the principal characteristics of, and the assessment and improvement framework applied in four RE-specific process assessment and improvement models: the Requirements Engineering Good Practice Guide (REGPG), the Requirements Engineering Process Maturity(REPM), the Requirements Capability Maturity Model (R-CMM), and the Market-Driven Requirements Engineering Process Model (MDREPM). This chapter also examines the utility and lesson learned of these models.

DOI: 10.4018/978-1-4666-4301-7.ch011

INTRODUCTION

Requirements Engineering (RE) is an important part of software development, which covers all aspects of the discovery, documentation, and maintenance of requirements throughout the software development life cycle (Sommerville & Sawyer, 1997). There exist RE standards that describe general principles as well as detailed guidelines for performing the RE process. Such standards include the IEEE Recommended Practice for Software Requirements Specifications (IEEE, 1998a), and the IEEE Guide for Developing System Requirements Specifications (IEEE, 1998b). However, these standards do not provide support to organization particularly in selecting appropriate methods or in designing an optimized RE process (Sawyer, 2004). In a survey conducted by Beecham, Hall, Britton, Cottee, and Rainer (2005), an expert panel consists of both practitioners and academics agreed that RE process remains the most problematic of all software engineering activities. Findings of other surveys conducted involving UK and Australian software companies (Beecham, Hall, & Rainer, 2003b; Niazi & Shastry, 2003) confirmed that these companies still considered requirements engineering problems very significant.

Consequently, many organizations seek to improve RE process by adopting the Software Process Improvement (SPI) approach (Napier, Mathiassen, & Johnson, 2009). However, according to Sawyer (2004), a European survey involving organizations who took part in SPI programs during the 1980s confirmed that the then available SPI models do not alleviate their problems in handling requirements. This is despite the fact that the SPI brought them several significant benefits. These scenarios have led to the development of a number of RE process improvement models such as the Requirements Engineering Good Practice Guide (REGPG) (Sommerville & Sawyer, 1997); the Requirements Capability Maturity Model (R-CMM) (Beecham, Hall, & Rainer, 2003a, 2005); the Requirements Engineering Process Maturity Model (REPM) (Gorschek & Tejle, 2002), and the Market-Driven Requirements Engineering Process Model (MDREPM) (Gomes & Pettersson, 2007). Sources of requirements engineering process improvement advice are available in the literature. For example, books written by Young (2001) and Wiegers (2003) are focusing at RE practice recommendations and advices on what organizations can do to improve their RE processes. However, these recommendations and advices for improving RE practices are not presented in a process maturity model.

Many business success stories often advice organizations to begin their process improvement journey by first applying a standard or model. Applying a standard or model is often perceived to provide a great tool and a good guide to achieve process improvement goals. However, different standards and models can also help achieve different goals. Thus, organizations are challenged to select different types of assessment and improvement standards and models to best suit their specific context and available resources (Nielsen & Pries-Heje, 2002; Sanders & Richardson, 2007).

This chapter aims to provide initial information for organizations to get to know some of the process improvement models, and perhaps later choose the appropriate models that can help achieve their desired goal. We begin with an overview of two RE-related process areas of the Capability Maturity Model Integration for Development (CMMI-DEV) developed by the Software Engineering Institute (SEI). Even though software engineering has witnessed the development of several other generic SPI standards and models such as ISO 9001 standard for quality management system (Weissfelner, 1999), BOOTSTRAP (Stienen, 1999), and ISO/IEC 15504 (Drouin, 1999), we limit our review to the CMMI-DEV only for several reasons. The main reason is easy availability of CMMI-DEV as a free download from the SEI website while other standards/models like ISO/IEC 15504 must be purchased from the