



Project risk management: lessons learned from software development environment

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Abstract

The challenges and realities in applying effective software risk management processes are difficult, in particular integrating the risk management processes into software development organizations. However, the benefits of implementing effective risk management tools and techniques in software development project are equally great. Current perceptions and emerging trends of various software risk management practices are reviewed and risks specific to software development projects are identified. Implementing effective risk management process will succeed by changing the organizational culture. This paper addresses lessons learned from implementing project risk management practices in software development environment.

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1. Software project environment

Project failures are the result of the multiplicity of risks inherent in software project environment. Software development projects are collections of larger programs with many interactions and dependencies. It involves a creation of something that has never been done before although the development processes are similar among other projects. As a result, software development projects have a dismal track-record of cost and schedule overruns and quality and usability problems. Jiang and Klein (1999) find different types of risks will affect budget, user satisfactions, and system performance. Other studies indicate that 15 to 35% of all software projects are cancelled outright, and the remaining projects suffer from schedule slippage, cost overruns, or failure to meet their project goals (Boehm, 1991) (Klein, 1998).

Time-to-market is the most critical factor for consumer in developing commercial software products. However the project success is difficult to predict

because project scope is changed by continuous market requirements and resources are constantly being reallocated to accommodate latest market conditions. Projects for specific customers also have a large degree of uncertainty for requirements due to the customized technical attributes. As a result, software development engineers have high turnover rates among software development firms. For example, software managers in India perceived personnel turnover as their biggest source of risk (Boehm and DeMarco, 1997).

Many software projects and programs involve multiple entities such as companies, divisions, etc., that may have certain interests. There is often a feeling of disconnection between software developers and their management, each believing that the others are out of touch with reality resulting in misunderstanding and lack of trust. Research shows that 45% of all the causes of delayed software deliverables are related to organizational issues (van Genuchten, 1991).

2. Software risks and risk management perceptions

Current perceptions about risk management from majority of software project organizations contributes to the lack of project stability in addition to the inherent

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challenges posed by the nature of software projects. Kwak and Ibbs (2000) identified risk management as the least practiced discipline among different project management knowledge areas. Boehm and DeMarco (1997) mentioned that “our culture has evolved such that owning up to risks is often confused with defeatism”. In many organizations, the tendency to ‘shoot the messenger’ often discourages people from bringing imminent problems to the attention of management. This attitude is the result of a misunderstanding of risk management.

Boehm (1991) identified 10 software risk items to be addressed by software development projects:

- Personnel shortfalls
- Unrealistic schedules and budgets
- Developing the wrong functions and properties
- Developing the wrong user interface
- Gold plating (adding more functionality/features than is necessary)
- Continuing stream of requirements changes
- Shortfalls in externally furnished components
- Shortfalls in externally performed tasks
- Real-time performance shortfalls
- Straining computer-science capabilities.

Jones (1998) further presented three key software risk factors and concerns of both executives and software managers.

- Risks associated with inaccurate estimating and schedule planning
- Risks associated with incorrect and optimistic status reporting
- Risks associated with external pressures, which damage software projects.

However, most software developers and project managers perceive risk management processes and activities as extra work and expense. Risk management processes are the first thing to be removed from the project activities when the project schedule slips. The free-spirited culture in many software development firms is in conflict with the amount of control often required to develop complex software systems in a disciplined way. Jones (2001) mentioned “it is a peculiarity of IT that very complex systems can be built with a very low level of control by clever, driven people”. Many software development practitioners understand risk management and control as inhibiting creativity.

3. Various software development risk management processes

Despite the inherent risks associated with software development projects, there are strong indicators that

these risks can be managed successfully. Research of failed software projects showed that “their problems could have been avoided or strongly reduced if there had been an explicit early concern with identifying and resolving their high-risk elements” (Boehm, 1991). Effective risk management is the most important management tool a project manager can employ to increase the likelihood of project success. Since risk management is not widely used and understood, this could be a significant competitive advantage to those that implement the risk management processes in their projects.

A large number of processes have been generated in recent years to address the need for more effective risk management. The risk management process provided in the PMBOK® (PMI, 2001) is a good overview of the typical processes, yet it is often too generic to meet the specific needs of software projects. The Software Engineering Institute (SEI) has developed the Team Software Process™ (TSP™) for the team as a whole, and the Personal Software Process™ (PSP™) for the individual during software project development (SEI, 2001). Keshlaf and Hashim (2000) have developed models for tools to aid the software risk management process. As shown in Fig. 1, it uses an eight-step process during the initial phases of the project. When any new risks are identified throughout the project, a five-step inner process is used to improve earlier estimates and judgments continuously.

‘Team risk management’ is a process that addresses the risks associated with multiple entities (Higuera et al., 1994). Although developed specifically for software contractual relationships, the concept is just as viable for multiple divisions or multiple projects, which is a common paradigm in most organizations. Table 1 shows the principles involved with team risk management and the requirements for effective risk management in the process.

The ‘team reviews’ section is the principal process that makes the team process unique from other general

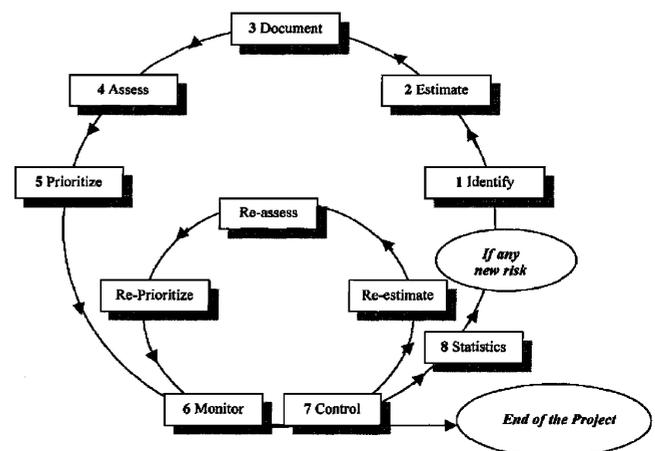


Fig. 1. ‘Soft Risk’ model’s diagram (adapted from Keshlaf and Hashim (2000)).

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