Integrated Approach to Risk Management for Custom Software Development and Maintenance Initiatives

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ABSTRACT

The proposed integrated approach to risk management explores the limitation of a risk management approach that focuses only on project implementation risks. The integrated approach not only manages project risks but also program risks. Case studies illustrate how the integrated approach to risk management has been used in software development initiatives. The main inference from the integrated model is that senior management needs to empower project managers to have a holistic perspective of risk and its management.

INTEGRATED APPROACH TO RISK MANAGEMENT

Studies on software development initiatives indicated that a myopic view of risk management seems to characterize current software project management practice in spite of developments in risk management theory on how to identify risk factors, calculate their probability and effect on a project, and risk management (Fairley 1994, Conrow & Shishido 1997). However, most software professionals treat risk management as a mechanism to set on course software projects that have gone awry resulting in many software projects falling short of promised quality, cost, and schedules (Glass 1998).

Research on risk management for software initiatives have traditionally focused on tackling specific tasks in project management leading to three challenges (Lyytinen et. al. 1996). First, it is often difficult to obtain empirical evidence of the practical workings of risk management techniques. Second, there may be ad hoc heuristic techniques being employed by project managers along with formal methods. Third, the organization environment is often ignored in the risk management approach. Alter and Gizenberg (1978), and McFarlan (1982) state that users may have no experience or inclination to use the software system that is being developed for them. Software development teams sometimes fail to analyze the IT environment in which the software is to work (Barki et. al. 1993). The software development teams also have poor visibility on the management environment that prevents from getting useful information especially from senior management (Keil 1995). Risks in software development prevent project managers to estimate their usefulness, or implementation difficulty, and lead to delays and rework (Boehm 1989, Boehm & Ross 1989). The integrated approach to risk management proposed in this study tries to address these challenges in risk management by integrating program and project risks explicitly into a model. The program includes, in addition to projects,

a set of resource suppliers (like IT services vendors) and a set of business benefit recipients.

The integrated approach to risk management understands and explores the limitation of a risk management approach that focuses only project implementation risks. The limitations have been exposed by numerous instances of "unforeseen" risks derailing software projects. The project managers usually do not have the visibility or control over these "unforeseen" risks. A Delphi exercise based on existing research in this

Table 1. Important external program risks

Business environment
1. Unstable corporate environment
2. Change in ownership or senior management and globalization
3. Discontinuity in the industry of sudden changes in statutory environment
4. Lack of top management commitment to project
5. Artificial deadlines driven by statutory or external event

Business IT alignment
1. Project not based on sound business plan
2. Unforeseen financial constraints
3. Fluidity of program

User acceptance
1. Failure to identify all stakeholders
2. Failure to get buy in approved from all stakeholders
3. Failure to gain user commitment
4. Conflict between user departments
5. New and/or unfamiliar subject matter for users

Organizational politics
1. Pre-emption of project by higher priority project
2. "All or nothing" projects

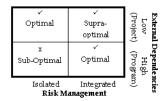| Change management |
| --- |
| 1. Not managing change in organization structure properly |
| 2. Not managing change in organization processes properly |
| 3. Inadequate program management structure |

Forecasting and estimation
1. Underestimating resource estimates
2. Lack of visibility of growth plans or non-functional parameters

Outsourcing
1. Friction in transferring knowledge about the program
2. Mismanaging the transition form in-house to outsource

Absence of project risk management strategy

Figure 1. Risk management and external dependencies

	Isolated	Integrated	
Low (Project)	✓ Optimal	✓ Supra-optimal	**External Dependencies**
High (Program)	x Sub-Optimal	✓ Optimal	

Risk Management

domain by Cule et. al. (2000) with five project mangers who had seven or more years of experience in managing IT initiatives revealed the important program risks (listed in Table 1).

Even though these external program risks are usually beyond the direct responsibility of the project managers, it is imperative that they are aware of these risks at the beginning of the project. Mitigation plans for such risks are typically much more complex as they cannot be managed in isolation by the project manager. They need to be managed with the active support of the other senior management stakeholders in the project including the sponsor, the end user, and IT services vendor.

Wherever the project scope is well defined and there are few external dependencies, even isolated risk management techniques can suffice. Isolated risk management techniques at a project level have been in existence for a few decades and they are well understood and practiced, especially by IT divisions of large enterprises and IT services vendors engaging in outsourcing and operating at high process maturity levels (Boehm 1991, Hall 1997).

The challenge lies in successfully managing programs that involve a high number of external dependencies. These typically involve strategic initiatives for achieving strategic business objectives, and require a large number of interfaces and stakeholders. It is in such programs that isolated risk management techniques fail. The relationship between risk management and the external dependencies are shown in Figure 1.

The integrated approach to risk management identifies the software program risks first. This step describes the risks and gives the context in which they are likely to occur. An analysis of the program risks classifies risks as pertaining to the project or external to the project. The external risks can be managed with inputs from senior management who are more aware of the larger organizational dynamics while the project manager manages project risks. A key feature of this process is that the impact of program risks needs to be assessed at the project level since they have a direct impact on project success.

METHODOLOGY

We used a case study methodology (Yin 1994) to study three software development and maintenance programs to understand how the proposed integrated approach to risk management works in real life situations. The review of research literature and a study of three programs and fifteen projects (that were associated with the three programs) provided the knowledge of the general risk management as practiced. This knowledge was used to synthesize the integrated approach to risk management elucidated in the previous section. The integrated approach to risk management was disseminated to sponsors of the software development initiatives in three multinational enterprises and about fifty project managers in an IT services vendor. After six months we studied the three programs and fifteen projects that were managed by project managers who had been exposed to the integrated approach to risk management. The names of the enterprises and the stakeholders are not revealed due to sensitive nature of the case studies. The dominant mode of analysis of the case study used in this research is explanation-building (Miles & Huberman 1994). We are in the process of studying more cases and developing a probability model for integrated risk management.

CASE STUDIES

Case 1: User Interface Risks in Developing a Customer Information Portal

A large financial conglomerate with multiple product lines had unsuccessfully attempted a customer integration hub project a couple of times in the past. When the conglomerate decided to take it up for the third time, the project manager assigned decided to begin the project by studying the key reasons for the previous failures, and thereby enumerating the risks for the current attempt. The primary risk that emerged from this exercise was that of user acceptance. However rich in functionality the application was, business users preferred to revert to the legacy applications that they had grown familiar with. Armed with this insight, the project manager invested energy and money on hiring user interface modelers and planned the prototyping phase in great detail, insisting on involving certain influential users in the approval process for the user interface design. Thus the project manager had converted his biggest prospective critics into the most vociferous champions for the application. Six months later, the customer integration hub went live on budget and schedule, to rave reviews from the users.

A holistic risk evaluation exercise was instrumental in uncovering a hidden risk that might have led to the failure of the program. Instead of focusing merely on technical project risks, the project manager took an integrated approach linking the user perspective to the technical challenges, which made the difference between success and failure.

Case 2: Globalization Risks in Developing a Customer Information Portal

In the same program as discussed in Case 1, one risk that was recognized early on by the project manager was that of the high degree of external dependency. The program manager was from the USA, while the application was to be rolled out on a worldwide scale. It was a logistical nightmare to be able to engage business users from other geographical areas to define functional requirements that were tailored to local situations. The IT department in the various geographies had to detail the interfacing requirements of the customer information portal with their respective local applications. When the project manager found that she was unable to bring all stakeholders on to a common risk management agenda, she quickly scaled down the scope of work to the USA operations as a pilot exercise. Once the application was rolled out successfully in USA to appreciation from the business user community there, it became much simpler for the project manager to propagate global cognizance of the necessity to manage the program in an integrated manner.

The risk evaluation exercise allowed the project manager to discover that she was unable to assess and mitigate risks at a worldwide scale, due to reasons of organizational structure that were beyond her control. Her only recourse was to reduce the scope of the program to a manageable level, so as to maximize chances of success despite the isolated risk mitigation strategy.

Case 3: Stakeholder Acceptance Risks in Developing a Customer Information Portal

The customer information portal application discussed in Cases 1 and 2, the application needed to interface with twenty different upstream software applications. One of the prerequisites to the system test phase of the development life cycle was the availability of sample feeds in the correct format, from each of the interfacing applications. Non-availability of these test feeds on time was recognized as a risk to completing the project on schedule. When the project manager convinced the IT departments of the financial conglomerate that owned the interfacing applications to integrate their project schedules and risks, she discovered that two of the applications could not meet the deadlines imposed by her schedule, for valid reasons. She revisited the project schedule and re-

prioritized the testing of these two feeds, thus ensuring that the overall program schedule was still met.

When the project manager took an integrated view of the program risks, what she had initially identified as a project risk became known to be a certainty instead of a risk. She then had to merely plan for it.

INFERENCE FROM CASE STUDIES

The case studies point to the relationship between risk management and the external dependencies. Managing risks in programs that involve a high number of external dependencies is the key to success in software development initiatives. External risks need to be analyzed with inputs from the senior management and an integrated risk management strategy needs to be put in place that mitigate external and internal project risks and plans for certainties. Senior management should share their knowledge of program risks with the project managers. Project managers must be empowered to take a holistic perspective of risk and its management at each phase of the program, from conceptualization to execution. This ensures that the project managers take appropriate risk mitigation steps that result in successful IT initiatives. The change in mindset is not easily achieved by training interventions alone. Successful enterprises have achieved this by aligning rewards and recognition, and providing an environment that is conducive for project managers to use the integrated approach.

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