

Risk Management in Software Development: A continuous Process

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Abstract- Is risk management up to the task of improving outcomes in software projects? If we are developing any software plan or test plan or test strategy for our project then our main concern is to address all risks properly. Software development is a highly complex and unpredictable activity associated with high risks. With more and more organizations investing substantial resources in software development, risk management becomes crucial. The present paper tries to ask these three questions: What are most frequently used risk management approaches? What is the process of risk management? How to apply risk management in practice?

I. INTRODUCTION

The most common definition of risk in software projects is in terms of exposure to specific factors that present a threat to achieving the expected outcomes of a project. On this basis, risk in software projects is usually defined as the probability-weighted impact of an event on a project. Simplistically, $R=P*I$ where R is the risk exposure Attributable to a particular risk factor , P is the probability the undesirable event will be realized and I is the impact or magnitude of the loss if the event occurs. Risk exposure is usually measured in dollars or time in commercial projects. In other words, Risk are future uncertain events with a probability of occurrence and a potential for loss. Risk identification and management are the main concerns in every software project. Effective analysis of software risks will help to effective planning and assignments of work.

II. WHAT IS RISK MANAGEMENT?

Risk management is the identification, assessment, and prioritization of risks(defined in ISO 31000 as the effect of uncertainty on objectives) followed by coordinated and economical application of resources

to minimize, monitor, and control the probability and/or impact of unfortunate events or to maximize the realization of opportunities. Risks can come from uncertainty in financial markets, threats from project failures(at any phase in design, development, production or sustainment life cycles), legal liabilities, credit risk, accidents, natural causes and disasters as well as deliberate attack from an adversary, or events of uncertain or unpredictable root-cause. Several risk management standards have been developed including the Project Management Institute, the National Institute of Standards and Technology, actuarial societies, and ISO standards. Methods, definitions and goals vary widely according to whether the risk management method is in the context of project management, security, engineering, industrial processes, financial portfolios, actuarial assessments, or public health and safety.

III. FOUR TYPES OF RISKS

Complex projects are always fraught with a variety of risks ranging from scope risk to cost overruns. One of the main duties of a project manager is to manage these risks and prevent them from ruining the project. In this paper, we will cover the major risks involved in a typical project.

1.Scope Risk- This risk includes changes in scope caused by the following factors: One is Scope Creep- the project grows in complexity as clients add to the requirements and developers start gold plating. Second one is Integration Issues, Third one is Hardware and software defects and fourth one is Change in dependencies.

2.Scheduling Risk- There is a number of reasons why the project might not proceed in the way we

scheduled. These include unexpected delays at an external vendor, natural factors, errors in estimation and delays in acquisition of parts. For instance, the test cannot begin the work until the developers finish their milestone deliverables and a delay in those can cause cascading delays. To reduce scheduling risks use tools such as a Work Breakdown Structure(WBS) and RACI matrix(Responsibilities, Accountabilities, Consulting and Information) and Gantt charts to help us in scheduling.

3. Resource Risk- This risk mainly arises from outsourcing and personnel related issues. A big project might involve dozens or even hundreds of employees and it is essential to manage the attrition issues and leaving of key personnel. Bringing in a new worker at a later stage in the project can significantly slow down the project. Apart from attrition, there is a skill related risk too. For instance, if the project requires a lot of website front end work and our team does not have a designer skilled in HTML?CSS, we could face unexpected delays there. Another source of the risk included lack of availability of funds. This could happen if we are relying on an external source of funding(such as a client who pays per milestone) and the client suddenly faces a cash crunch.

4. Technology Risk- This risk included delays arising out of software and hardware defects or the failure of an underlying service or a platform. For instance, halfway through the project we might realize the cloud service provider we are using doesn't satisfy our performance benchmarks. Apart from this, there could be issues in the platform used to build our software or a software update of a critical tool that no longer supports some of our functions.

IV. FOUR TYPES OF RISK APPROACHES

Risk management approaches are typically represented using the concepts of risk items, risk resolution techniques, and heuristics

1. Risk list-

Risk list approach provides a list of prioritized risk items. This list of risk items helps a project manager focus on possible source of risk. However, it does not

contain related information about appropriate resolution actions. Usually, this risk list is easy to use in assessing risks. Likewise, it is also easy to build, drawing upon literatures on risks or experiences within a particular context. Typically, risk items can be classified into two categories: system items and specific items. System items are those occur in most software projects. Specific risk items are related to project characteristics and organizational context.

2. Risk-action list-

Risk-action list is an approach which offers a list of prioritized risk items with related resolution actions. This list contains prioritized risk items, with one or more related resolution actions for each risk item. Similar to risk lists, risks; they are easy to build; and they are easy to modify when needed. However to build the resolution actions, they require additional knowledge of the potential effects of different types of actions. This approach offers the same supports to appreciate risks as risk list does. In addition, risk action list uses a heuristic to identify possible actions that will help resolve specific risks. Two primary steps for software risk management: risk assessment and risk control. For the primary step, risk assessment, three subsidiary steps: risk identification, risk analysis, and risk prioritization. For the secondary step, risk control, also involves three subsidiary steps: risk management planning, risk resolution, and risk monitoring.

3. Risk Strategy Model-

Risk-strategy model is a contingency model that relates aggregate risk items to aggregate resolution actions that risk-strategy model combines comprehensive lists of risk items with resolution actions. First, this approach abstracts categories of risks items with resolution actions. And then abstracts categories of actions to arrive at an overall risk strategy. This approach uses a simple scale such as high or low to assess the risk profile along the risk categories. Through this way, it is possible to classify the project into one of a few possible situations. Then, for its situation, the model offers a risk strategy with several detailed resolution actions.

4. Risk-strategy analysis-

Risk-strategy analysis is a stepwise process which links a detailed understanding of risks to an overall risk management strategy. This approach is very similar to risk-strategy model. It offers detailed and aggregate risk items and resolution actions, but it applies different heuristics. The difference between this approach and the risk-strategy model is that there is no model linking aggregate risk items to aggregate resolution actions. Rather, this approach adopts a stepwise analysis process. In the process, the involved actors such as customers, developers, managers, link risks to actions to develop an overall risk adopts a stepwise analysis process. In the process, the involved actors such as customers, developers, managers, link risks to actions to develop an overall risks strategy. In contrast with risk-strategy model, the relationship between the aggregate risk items and aggregate resolution actions is looser.

