Managing Risk Proactively in Product Development Projects

Preston G. Smith

New Product Dynamics, Portland, OR, USA, preston@NewProductDynamics.com

Abstract

By nature, product innovation involves considerable risk. But much of the risk can be identified in advance (proactively), and means of dealing with the risk can be pre-planned, which makes it much less disruptive to project objectives. This paper covers both a process for managing risks proactively and a model of a risk that reveals its critical characteristics, thus enabling proactive risk management.

1. INTRODUCTION

As we have improved in managing the product development process, portions of it that have not been improved become more apparent. Such is the case currently with the risks or "surprises" that occur late in a project, apparently without warning.

Many companies have moved to a formal product development process, often with phases and gates. They believe that this process incorporates risk management because they have built into it a requirement to identify and deliver a list of project risks as a deliverable for the initial phase. Unfortunately, this list of delivered risks, by itself, does nothing to prevent the risks, and companies seldom move beyond this to manage their project risks. Worse, producing this list and not pursuing it is embarrassing when risks on the list start happening later. These companies would have been wiser to not even identify their risks initially.

This paper outlines a thorough process for identifying *and* managing risks throughout a project.

2. THE RISK MANAGEMENT PROCESS

Managing the risk in a project involves following a certain process, and most such processes provided in the literature are reasonably similar. For example, the Project Management Institute's Body of Knowledge outlines a process of preparation and planning, risk identification, qualitative and quantitative analysis, response planning, and ongoing monitoring [1]. Similarly, we suggest the five-step process shown in Figure 1 [2].

Such processes are also similar to ones engineers use in design to resolve potential safety and reliability problems. In automotive and similar industries, the technique they use is called failure mode and effect (FMEA) analysis [3]. In the same vein, the Food and Drug Administration in the United States requires that a comparable hazard analysis be done for new medical devices.

However, as similar as these engineering techniques appear to be to project risk management, they are actually fundamentally different. These engineering tools are applied to the design, they cannot start until a design exists, and they are aimed at finding certain flaws in the design, usually of a safety or reliability nature. In contrast, project risk management is aimed far more broadly at the business success of the entire project. Anything—engineering- or design-related or not—that stands in the way of the project meeting its schedule, budget, or performance objectives is a concern of project risk management.
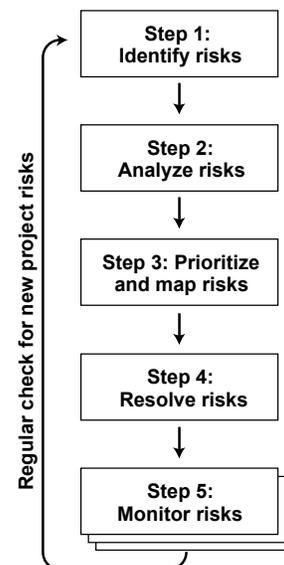
Figure 1. A five-step process for managing project risks. Reprinted with permission from Preston G. Smith and Guy M. Merritt's *Proactive Risk Management: Controlling Uncertainty in Product Development* (Productivity Press, 2002). Copyright 2002 by Preston G. Smith and Guy M. Merritt.

Project risk management can—and should—start much earlier in the project than the detail design phase.

The five steps build upon their predecessors:

- Step 1, executed using brainstorming techniques, attempts to uncover any risks that could prohibit achievement of project goals. Although each risk must be stated clearly and must also have its specific impact on the project stated clearly, the team should not be concerned at this time about how serious the risk is.
- Step 2 is where the team identifies facts from the project environment (we call these facts *drivers*) to support each risk, and these facts form the basis for determining how serious the risk is. Some risks, upon scrutiny, will not have facts to support them, and these risks can be dismissed at this point.
- Step 3 uses these facts and certain data derived from them to determine how serious each risk is relative to the others in the project. That is, the team prioritizes all risks for the project and then decides on a threshold for choosing the most serious risks to carry forward. Although it would be satisfying to resolve all project risks, the team can usually identify far more risks than it has time and resources to resolve, so some difficult choices must be made at this point.
- Step 4 carries each project risk from this short list into an action planning process, developing plans to prevent the risk from occurring if possible. If such plans still leave a significant possibility for the risk to occur, or if they will require time before they are fully effective, then the team also formulates contingency plans to reduce the seriousness of the risk if it does occur.
- Step 5, unlike the proceeding ones that occur only once as indicated in Figure 1, occurs repeatedly to monitor progress on the action plans and to retire action plans when they have been successful or the risk has occurred despite them.

3. A MODEL OF A RISK

The foregoing process is rather obvious, and everyone who manages project risk uses some variant of it. In contrast, we also suggest using a model of a risk, and, to our knowledge, no one else is using such a model. The model is applied to each risk that is identified for the project. It is like an x-ray picture of the risk in that it allows us to see inside of the risk and observe how it really works. As such, it is very useful in formulating effective, actionable plans for resolving the risk.

Figure 2 is a risk model. Like all such models, it is a simplification of reality. One could easily imagine more complex models that portray more details of the risk. We have experimented with more complex ones but, usually, we have found that they add considerably to the effort of risk management without commensurate benefits. Conversely, we have tried simpler models but have found them lacking in essential details (see Chapter 2 of [2] for more information). Consequently, the model shown in Figure 2 is the one we recommend for most project risks.
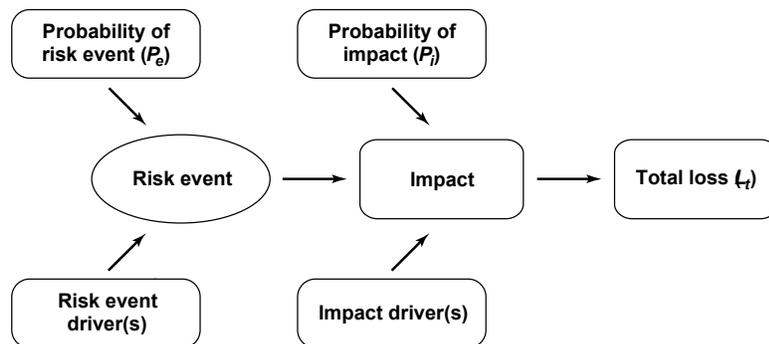
Figure 2. A model of a project risk that is very useful for managing the risk. Adapted from Fastrak Training Inc. training material. Used with permission. ©1996.

Using a typical risk from a product development project, I illustrate how this model is used. Suppose that you are designing a product that incorporates a microprocessor, and you plan to use the Z423ap microprocessor, with which you are familiar, in it. Your identified risk (risk event) might be:

Risk event: Vendor discontinues microprocessor Z423ap before we go into production

The impact on your project is a delay while you recover, specifically:

Impact: Project is delayed while we find a replacement microprocessor, prepare to use it, and redesign the circuit and software.

The total loss is simply the magnitude of the impact, assuming that it happens:

Total loss: six months

Especially useful are the drivers shown at the bottom of Figure 2, which are the facts in the project environment that lead you to believe in this risk. We keep the risk event drivers separate from the impact drivers because they lead to different kinds of action plans. Some drivers for this risk might be:

Risk event drivers:
1. The Z423ap has been in production for four years
2. This vendor normally discontinues microprocessors after four to five years without warning
3. Our schedule shows that we have ten more months until we are in production

Impact drivers:
1. Newer microprocessors use a different programming language, with which we are not experienced
2. Training time to learn a new microprocessor tool set is three months
3. Redesign time for the board is two months
4. One month is needed to test the new design

These drivers put this risk on a solid foundation. First, they allow you to estimate the total loss of six months accurately and factually. Second, they similarly allow you to estimate the two probabilities at the top of Figure 2 based on project facts rather than opinion. Most importantly, they lead naturally to solid action plans. For example, risk event driver 1 suggests immediately that perhaps you should use a newer microprocessor rather than designing the Z423ap into your product. Risk event drivers generally suggest action plans that prevent the risk from occurring. In contrast, impact drivers suggest ways of reducing the severity of the risk if it does occur (this is why our model keeps the risk event and its impact separate—so that you can separate these different types of action plans). For example, impact driver 2 suggests that you could start training your developers in the new tool set now to keep this three-month period off of the project's critical path. Then, if the Z423ap were discontinued, your total loss would be only three months rather than six.

The three numerical quantities—indicated in italics in Figure 2—are multiplied together to yield an *expected loss*. The expected loss is the loss you would expect from this risk on average, given that the risk event will not always happen and, even if it does, its impact may not occur. The expected loss is used in step 3 (risk prioritization) to rank all of the risks you have identified for the project and determine the most serious ones for which you will take the effort of preparing and executing action plans.

4.   IMPLEMENTATION ESSENTIALS

Should you wish to manage risk better on your projects, implementing a process for it—something akin to Figure 1—is obvious. Although many people manage their project risks quite well without an

explicit risk model, we believe that a risk model is a valuable tool that is well worth applying to each identified project risk.

However, there is an area in addition that will require careful thought in order to create an enduring implementation. We cover some of these implementation essentials here.

Consider risk also as an opportunity The tone of risk management can be rather negative: we are looking for things that can go wrong and working to keep them from happening. If we follow this trail to its logical end, we will drive out all of the surprise in the project—the very innovation we seek. Innovation requires assuming risk. We simply would like to be able to choose the risks we take and be aware of the uncertainties in the project.

Involve a cross-functional team When developing products, it is quite natural to see the project as a technical one involving mostly engineers and scientists. In contrast, the risks that are likely to keep you from being successful with your project will be mostly non-technical ones. For example the Z423ap microprocessor risk above appears to be a technical one, but it is actually a supplier issue. If you do not involve your purchasing people in managing your risks, you would be likely to miss this risk. Similarly, involve marketing, manufacturing, finance, regulatory, and other functions that will give you a broader perspective.

Operate proactively The key characteristic of effective risk management is being proactive about it. This means that you identify risks and do something about them *before* they affect your project. However, this is easier said than done. Many managers are reluctant to spend time or money on potential problems, since they have plenty of real problems already. Proactive management of risks is a style that is foreign to many Western managers.

Ban firefighting The opposite of being proactive is firefighting, a management style that thrives on the excitement of waiting until situations are almost hopeless and then saving them miraculously. This style does not fit with proactive risk management, so if you have such individuals in your organization, they will have to be reoriented or discharged.

Train your people It is obvious that project teams will have to be trained in the nuances of applying the risk model to project risks. Our experience has been that writing clear, specific risk events, impacts, and driver statements is a learned skill. Not so obvious is that management will have to be trained also or they will attempt to reformulate the model and argue over what is a risk.

Understand the work involved On the surface, risk management seems to be extra work. What is not so clear is that the process saves time in the end, because teams will be spending less time at the end of the project dealing with "surprises." Teams need to appreciate this or your risk management program is unlikely to be accepted.

See Chapter 11 and also Chapter 1 of [2] for additional implementation guidance.

REFERENCES

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