PRODUCT DEVELOPMENT
BEST PRACTICES REPORT

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PD

DEALING WITH PROJECT RISKS SUCCESSFULLY

Special Series on Risk Management: By Preston G. Smith and Guy M. Merritt

PART 1: YOU CAN'T MANAGE A RISK UNTIL YOU CAN UNDERSTAND IT

Team members and their managers have many fears about managing the risks in their projects. Some are concerned that since risks are so subjective, a risk is ultimately just my opinion versus yours. Others are worried about spending extra time – which they do not have – on managing their project's risks. Finally, some managers worry that if all risks to a project were exposed, the team would be paralyzed, certain that their project was doomed to be overwhelmed by problems.

All of these fears can be overcome by using a tool that allows you to visualize each risk threatening your project, understand its inner workings, and find effective ways to thwart it. In our experience, the best such tool available is an effective model of a risk. This article will introduce such a model and show you how to use it to manage a project risk effectively.

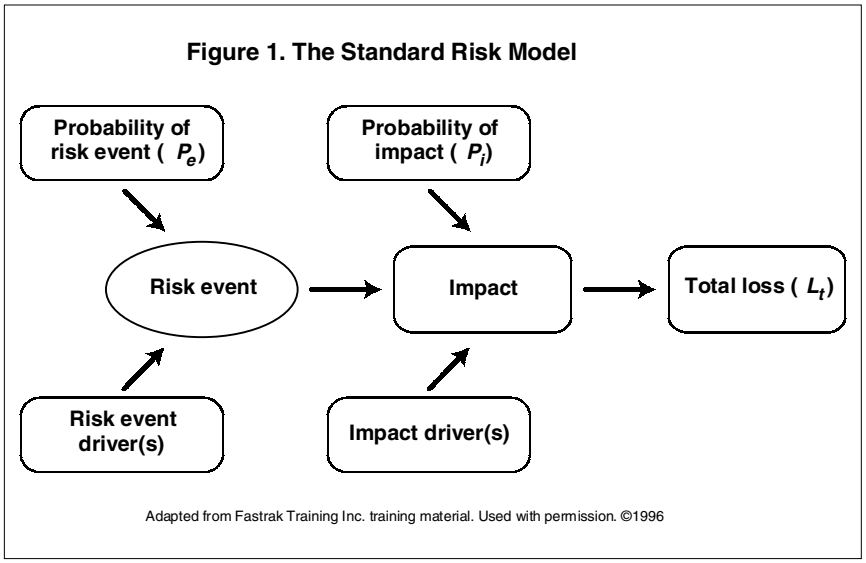


Figure 1. The Standard Risk Model

Adapted from Fastrak Training Inc. training material. Used with permission. ©1996

Figure 1 is what we call the *Standard Risk Model*. We will demonstrate how it works by filling it in for an illustrative project risk, and then we will highlight the model's benefits relative to this risk. Suppose that you are developing a hand-held electronic instrument with a plastic housing. The risk that you are worried about for this project is that an engineering sample will fail a company-standard drop test. If this occurs, you will have to redesign the housing, fabricate a new one, and test it with your product, all of which will cause serious delays.

Following Figure 1, we first fill in the *risk event* as a clear statement:

Risk event: Housing on engineering sample fails a drop test.

This simply states what we are worried might happen. Next, we fill in the *impact*, which is the undesirable consequence of the risk event:

Impact: Must redesign and build a new housing, then retest the engineering sample.

Now we drop down to the *drivers* at the bottom of the figure. Drivers are simply the facts in the project environment that lead you to believe that the risk event and its impact could occur. These

drivers are extraordinarily helpful in dealing with a risk, because they remove the risk from the realm of conjecture and place it on a solid factual foundation. If you cannot state any drivers for this risk, then you can dismiss it as being groundless. In the case of our example risk, however, there are some drivers:

Risk event drivers:

1. *Previous housing designs failed their drop tests 50% of the time.*
2. *The test procedure has been changed to require drops from different orientations.*
3. *We are using a new resin supplier for this housing.*

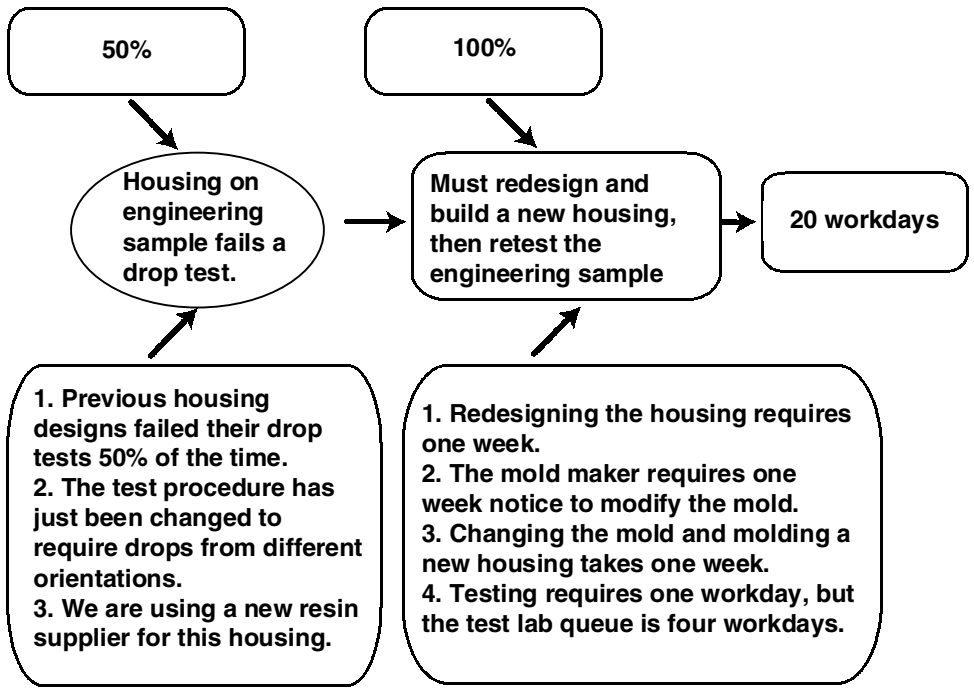
Impact drivers:

1. *Redesigning the housing requires one week.*
2. *The mold maker requires one-week notice to modify the mold.*
3. *Changing the mold and molding a new housing takes one week.*
4. *Testing requires one workday, but the test lab queue is four workdays.*

Notice that these two sets of drivers support the risk event and its impact, respectively.

Beyond convincing us that this risk is real, the drivers enable us to fill in the remainder of the risk model, based on fact, not conjecture. For example, the *probability of risk event*, in the upper left box of Figure 1, is 50%, based on Risk Event Driver 1 (which, in turn, is based on your actual experience in conducting such tests on previous designs). The box to the right, *probability of impact*, has a value of 100% in this case, because if the housing breaks under test, then the activities in the impact statement will definitely need to be repeated. If the impact were not a certain consequence of the risk event, then the impact drivers would help you to establish the value of the probability of impact. Be careful not to spend too much time deciding on the probabilities, which are simply educated guesses that follow from the quality of your risk event and impact drivers.

Figure 2. Risk model filled in for the example risk



Finally, the box at the right of the model, the *total loss*, is simply the quantified magnitude of the impact, which also comes from the impact drivers.

Figure 2 shows the risk model filled in for the example risk. Notice that this figure makes an excellent focal point for discussing this risk, understanding

how it works, and even questioning its seriousness to the project. We like to think of the model of a risk as an X-ray view that lets us peer inside of the risk.

However, this is just the beginning of the value of the risk drivers. They lead us naturally into means of resolving the risk. Although there are many kinds of action plans you can formulate to resolve a risk, the most popular ones are *prevention plans* and *contingency plans*. Prevention plans reduce the probability that the risk event will occur, and contingency plans reduce the impact's severity (either its probability of impact or its total loss) if the risk event does occur.

Prevention plans normally are derived from your risk event drivers. For example, Risk Event Driver 2 suggests that you could improve your odds of passing the test by developing a finite-element model of the housing for the new loading conditions before making the initial mold. And Risk Event Driver 3 might lead you to consider contacting the supplier of your new resin to see what information or assistance they might be able to provide on the impact strength of their resin.

Likewise, impact drivers lead you to plans for rendering the impact less severe if it does occur. For instance, Impact Drivers 2 and 4 both involve delay time to carry out a process. With this information, perhaps you could buy a slot in the mold maker's queue and find a back-up test lab with a shorter queue.

Construct one instance of the risk model for each risk you wish to consider for your project. The benefits of using such models relate to the fears listed at the beginning of this article:

- It removes a risk from the realm of opinion and places it on a factual basis.
- It allows you to make informed decisions regarding the time you wish to spend dealing with your risks – versus the time you will spend dealing with their consequences if you ignore or deny them.
- It places you in control of the risks on your project, rather than just letting imagined risks overwhelm you.
- Lastly, it presents you with a variety of effective actions you can take to resolve the risk.

In connection with Figure 1, we said that it illustrates the Standard Risk Model, implying that there are others. There are. One is a simplified version of this model with the risk event and impact stages compressed into one. Many risk management experts imply such a model. However, we find that it leads to confusion when you try to formulate action plans, because your prevention plans and contingency plans become intermingled and thus vague. There are several versions of the model that are more complex. Although they add more realism, they also require considerably more work. Thus, we find the Standard Risk Model most useful for most project risks. PD

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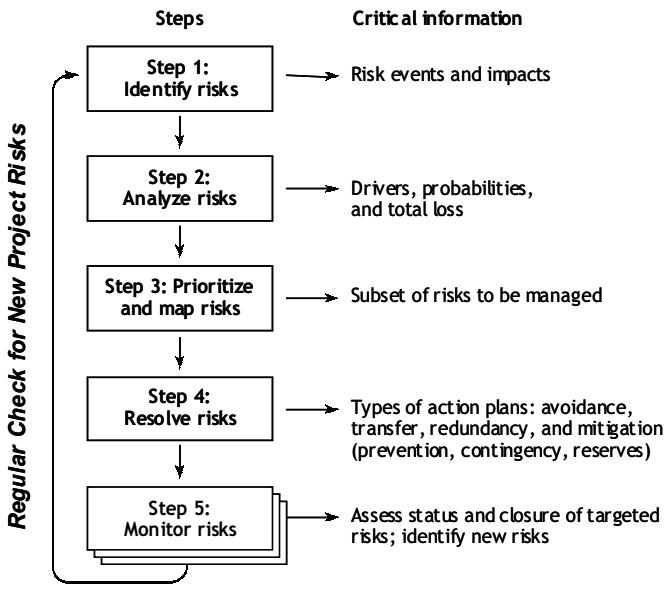
PART 2: YOU CAN'T MANAGE RISK WITHOUT A METHODOLOGY

In our last article, (*PDBPR*, October 2002) we described the standard risk model, which emphasizes critical risk components that must be managed. This model establishes a baseline of risk management understanding. In this article, we shift our focus to a process that can be used to effectively manage *uncertainty* in your projects.

The methodology we advocate here is by no means the only way to manage risks, but we have used this technique on many projects with consistent results, when applied correctly. It is important to note that no matter what type of risk management process you employ, *all risks will not be prevented* so we must ensure we have a methodology that also manages those risks that *do* occur.

Figure 1 shows a five-step process and lists deliverables for each step:

Figure 1



The five-step risk management process and critical information from each step. The first four steps are usually done once, but the last one is ongoing.

- Step 1 – Identify the risks you could encounter across all facets of the project.
- Step 2 – Analyze these risks to determine what is driving them, how great their impact might be, and how likely they are to occur.
- Step 3 – Prioritize and map the risks so that you can choose the most important ones to take action against.
- Step 4 – Plan how you will take action against the risks on this short list.
- Step 5 – On a regular basis, monitor progress on your action plans, terminate action plans for risks adequately resolved, and look for new risks.

These steps are fundamental to managing risk, so even when you modify the process, perhaps by streamlining it, adding more detail to it, or changing the nomenclature, you will still find these five activities in it. Recognizing these basic steps will help in adapting the process to other applications. The following paragraphs provide more detail on each step.

Step 1: Identifying Project Risks

In this initial step, you identify *risk events* and their *impacts*. A *risk event* is any occurrence that could prevent the project from meeting its defined goals of scope, schedule, cost, resource consumption, or quality. A risk event should precisely describe a happening that *could* occur with an associated time component or condition so that one can tell whether the risk event has occurred. Each risk event should also be accompanied by its *impact*, that is, a statement describing the loss that the risk event could cause. (For a better understanding of terms like *risk event* and *impact*, please see Part 1 of this series in the last issue of *PDBPR*.)

Warning: Many companies, especially those with a formal gated development process, do well at this first step of identifying their risks. But they do not follow through with the succeeding steps to take action against these risks. Thus, they gain no benefit from their risk identification and, indeed, suffer the embarrassment of seeing some of their identified risks happening later in the process, having taken no action to prevent them. Conclusion: do not undertake Step 1 unless you intend to follow through with the other steps.

Step 2: Analyzing Risks

Next, we list *drivers*, which are existing facts in the project environment that lead you to believe that *a particular risk event or impact could occur*. Drivers need to be as close to being factual as possible, which implies that no probabilities are associated with them. However, historical data could be so compelling that you could call it fact, for example, an organization might find that, *"In our previous 12 projects, graphical-interface software engineers have not been available for system requirements reviews."*

Next, we quantify our possible loss. The *total loss* should be an extrapolation from the impact statement developed in Step 1. For instance, if the *risk event* concerned a *"supplier's viability to provide a key component for our project,"* the *impact* would be *"the lost time to find an alternative solution,"* which could be *"60 workdays."* Total loss can be listed in terms of time, money, or quality, but our preference is to use time, which is the ultimate outcome for most product development risks. We represent total loss with the term L_t.

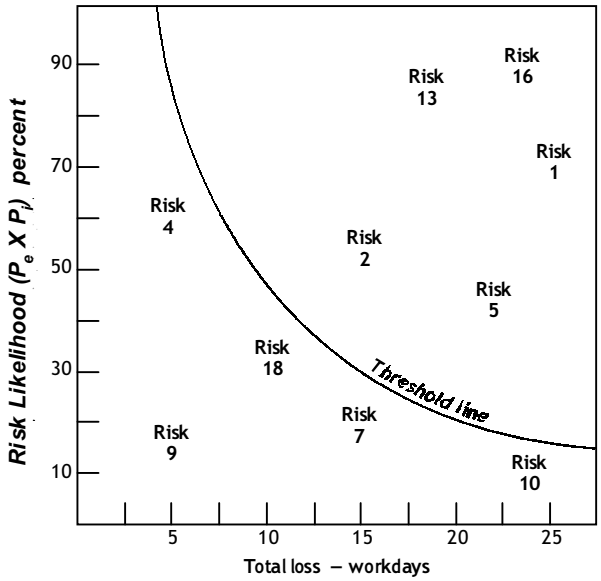
After listing the drivers and determining the total loss, probabilities need to be estimated for the risk event and its impact, identified by the terms P_e and P_i, respectively (again, see our prior article for more detail). To minimize needless arguing over subjective probabilities, we recommend that you restrict yourself to a small set of values, such as 10%, 30%, 50%, 70%, and 90%, for stating probabilities. Risk events will never have a probability of 100% since, in that case, it would not be a risk but an issue that the team must address; however, impacts can have probabilities of 100%.

All of these factors enter into calculating expected loss, which is determined by the following equation: $P_e \times P_i \times L_t = L_e$. Thus, expected loss ($L_e$) is the average (mean) loss associated with a risk. This quantity is used in the next step to prioritize risks.

Step 3: Prioritizing and Mapping risks

Expected loss is a prime criterion to cull the risk list so that we can target a short list of risks to manage actively. Other criteria, such as urgency, the cost of mitigation, or the catastrophic nature of a risk, may influence this short list. In order to compare your risks, express all expected losses on the same scale, usually either days of delay or a specific financial unit. By prioritizing your risks, you apply your resources most cost-effectively, according to the requirements of your project.

Figure 2



A risk map showing risks 1, 2, 5, 13, and 16 under active management and five more monitored candidates.

In addition to ranking your risks, you should also develop a risk map, as in Figure 2. This map displays two important quantities for each risk, total loss on the x-axis and the risk's likelihood ($P_e \times P_j$) on the y-axis. This map helps you to balance your prioritization. If you simply use expected loss you might miss a catastrophic risk that has a total loss with a very high value but a low likelihood. The risk map provides an excellent display of the risks you have identified, and it can greatly assist in seeing which high-loss risks need to be included on the list. A threshold line, drawn at a constant level of expected loss, separates the risks under active management from those that are candidates for being managed later.

Step 4: Planning Resolution of Risks

Each risk on your short list receives an actionable plan for its resolution. Action plans can be of many types, but the most common types are *prevention plans*, designed to deter the risk event from ever happening, and *contingency plans*, which deal with it if it *does* happen. The key to preventing risks is not to focus on the risks themselves but to change their risk event drivers.

Even with the best prevention plans, some risk events will happen. This is why you will also need contingency plans, which focus on the impact drivers. In some cases, even a contingency plan will not mitigate the risk adequately, and then you will have to establish reserves of time, money, or other resources, according to the type of loss that could occur. Remember, *prevention plans* work *to deter the risk event,* while *contingency plans* and reserves work *to minimize the loss* if the risk event does occur.

Step 5: Monitoring Project Risks

Constantly scan for changes in the project environment that may affect your action plans. The environment in which your project operates will change continually, potentially exposing new risks that you have not noticed before. Consequently, you should execute a smaller version of the risk identification step (Step 1) on a regular basis.

Risk management activity must be the center of attention at project meetings. The project manager should review progress on the managed list at each meeting, and the group should explicitly decide on additions to or removals from this list.

In addition, risk management status should be reviewed with management on a regular basis. The risk map is a particularly good way of portraying to management the current risk management situation. If a project's risk is being managed well, there are unlikely to be many surprises at the next review.[PD]

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PART 3: TECHNIQUES FOR IMPLEMENTATION

This is the final installment of a three part series on managing uncertainty in product development. Our first two articles focused on defining a standard risk model and a process to be utilized in managing risk. We are now going to broaden our discussion by outlining approaches to implementing a risk management program.

These techniques are based on our own experience in implementing project risk management as well as our knowledge of similar initiatives in a number of product development organizations. The suggestions presented here are critical points to keep in mind as you implement project risk management in your organization.

Integrate Risk Management Into Project Planning

From a project perspective, risk planning is just another step in the front-end planning of the project. To make risk management an integral part of your project management methodology, you must design a process, setting the clear expectation that, moving forward, proactive management of your risks will now be the norm.

Start by developing initial project plans and schedules to be used for initiating *risk identification*. In our experience, if you try to identify risks without at least a preliminary plan and schedule, you will formulate generic and imaginary risks because the project was not sufficiently understood.

Build Risk Management into All Project Phases

If there is a single key to making project risk management "stick" in your organization, it is to make it an integral part of all project phases and to treat it just as seriously as you do project scope, budgeting, scheduling, and resource allocation. Always consider the resource implications of managing project risk.

The simplest means of building project risk management into your project is to ensure that the early steps – identification, analysis, prioritizing and mapping, and risk resolution planning – are a normal part of an early phase of the project. Then, establish risk monitoring as a regular function of your project tracking activities.

Organizations often build risk identification into the beginning of the project and require a list of risks as a deliverable at the first project review. But since they do not continue with the full range of risk management activities, they merely *identify* risks without receiving the benefits that can be gained from effective risk management through the later phases of product development.

Train Your People

Without training, individuals will endlessly argue about what is "really" a risk – they will have no means of determining a risk's likelihood or total loss, and they will fail at creating risk resolution plans. For your team to be effective in managing risk, each member must understand the terminology and the process and gain some hands-on practice in applying them.

This training also extends to management. If management is not trained in the basic concepts and terminology, your team will suffer through chaotic management reviews while managers argue about the process and attempt to redefine the terms you are using. Management's training can be considerably briefer than the team's training.

Take Potential Problems Seriously

Many managers have difficulty spending money or other resources on problems that might not happen. This is a crucial point, because until you can take *potential* problems seriously, you will not have *proactive* risk management.

There are two steps in dealing with this phenomenon. First, observe that some of *yesterday's* potential problems are *today's* actual problems, and that management is consumed with actual problems today because they did not avert them yesterday. Second, to clarify the value of acting in advance on potential problems, analyze what some past problems would have cost had they been dealt with before they occurred. Most likely, your analysis will show that addressing problems *proactively* is considerably cheaper than dealing with them *reactively*.

Spare the Messenger

For various reasons, some organizations have created a culture that shuns bad news, which, unfortunately, is what risks are. The most apparent version of this is the "kill the messenger" syndrome. Milder forms include people who do not want to "look bad" in front of management or want to be "team players."

Properly managed, you can turn bad-news messages into good news. You accomplish this by not only presenting the risks but, along with them, a plan for what you are doing about them. By showing executive management your progress regarding risk resolution, you can establish a sense of control, even when your project is facing substantial risk.

Jump in

The fastest, most effective way to get started is to pick one project and use it as a pilot. Keep track of what works for you, what needs bolstering, and what can be eliminated or cut back as you work through this project. Then develop a rollout plan to institutionalize the process by documenting it and training participants on other projects.

A word of warning: we have seen many pilot projects succeed wonderfully, followed by second-generation projects that failed. A pilot strategy is a great way to get started quickly and at low risk; however, your risk management initiative will continue to need special care through several generations in order to succeed and to become well established.

Do Not Oversell Project Risk Management

A project risk management program can make substantial improvements in your projects' predictability, but it is not a cure-all. First, you will expend a significant amount of effort to implement project risk management. And then each project will take additional effort, although this should be more than offset by time and money savings from risks that have been averted.

In the real world, project risk management is not a blissful existence where there are no surprises – only one where there are *reduced* surprises. You cannot afford to eliminate all of the risks that you know about – while others are simply unknowable. Risk management is a constant game of improving your odds.

Extract the Learning from Each Project

Usually, you acquire this learning by conducting a project retrospective review. The process is much like the risk identification step: assemble a diverse project team, with a facilitator, and use cues, such as your product development process chart or a prompt list, to elicit observations on what was or was not especially effective or time-consuming. You are looking for three types of situations:

- items that could be added to or removed from your risk management process to make it work better,
- modifications you could make to parts of your risk management process to render them more effective,
- changes that you could make in how you develop new products such that you avoid certain risks that you experienced in this project.

It is essential to think of your project risk management program as an evolving one; to help ensure success you must keep track of what is working and what is not quite right yet, and you must make adjustments accordingly. PD

Preston Smith and Guy Merritt are coauthors of *Proactive Risk Management: Controlling Uncertainty in Product Development*, Productivity Press, 2002. You can reach Preston at preston@NewProductDynamics.com and Guy at Guy.Merritt@tellabs.com. More information about this book and other material about risk models is available at www.NewProductDynamics.com.

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