SOUNDVIEW Executive Book Summaries®
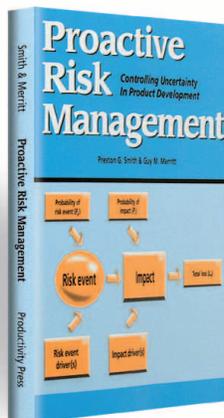
By Preston G. Smith
and Guy M. Merritt

CONTENTS

Controlling Uncertainty in Product Development

PROACTIVE RISK MANAGEMENT

THE SUMMARY IN BRIEF

Though most companies use some variation of stage-gate product development, they still expend little effort on risk management. Project managers identify risks before the initial gate, but ignore them instead of managing them effectively. The project experiences needless surprises in schedule, cost, budget or market acceptance late in the game, when the same problems have happened many times before.

This summary will enable product development teams to enhance their management of project risks by identifying risks early and managing them to diminish disruption throughout the project. Using a practical, easy-to-use, fact-based approach, it will help developers manage all the risks associated with a project. Although this process is tailored to commercial product development, it is applicable to many other types of projects with some adaptation.

What You'll Learn In This Summary

✓ **How to integrate risk management into project management.** This summary provides a five-step plan for managing project risk effectively.

✓ **How to model a specific risk.** This summary illustrates and defines the Standard Risk Model.

✓ **Guidance on identifying drivers of risks.** You'll learn to manage root causes instead of symptoms.

✓ **Appropriate quantification of the key factors of a risk.** This summary illustrates specific quantification methods that allow you to prioritize risks effectively.

✓ **How to implement project risk management at your company.** You will learn which tools and strategies will enhance implementation and which organizational and cultural impediments can undermine implementation.

PROACTIVE RISK MANAGEMENT
by Preston G. Smith and Guy M. Merritt

— THE *COMPLETE* SUMMARY

Risk and Risk Management

Risk is a loaded term, so think of risks as surprises. This book is about managing surprises in a project environment. A surprise could be an engineering design that fails in field trials, an unexpected competitor or an accounting error. In this summary, risk is defined as the possibility that an undesired outcome — or the absence of a desired outcome — disrupts your project. Risk management is the activity of identifying and controlling undesired project outcomes proactively.

Risk management is an integral part of project management, and product development inevitably requires project management. Risk management should occur as naturally as managing a schedule, but generally it gets lost in the crunch to get the new products out the door. The goal of this book is to build innate project risk management methodology into an organization.

Every Project Decision Involves Risk

Risk is inherent in product innovation, and therefore every decision about a project involves risk because there is always information we will not have until further downstream. Businesses assume certain risks because of today's increased focus on time-to-market. But importance of time-to-market also makes the schedule delays caused by unmanaged risks less tolerable.
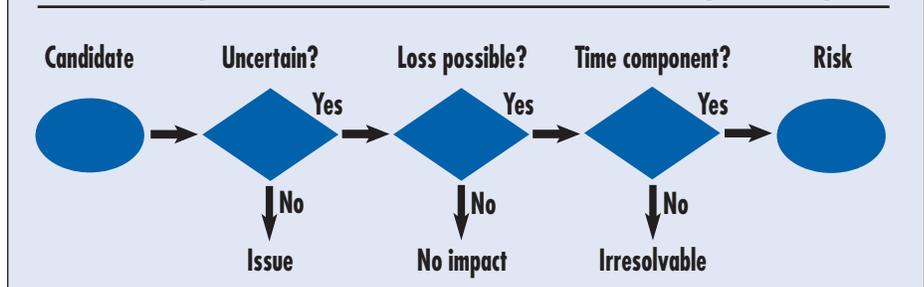
Risk management always deals with uncertainties, whether or not the risk will happen. You will only know for certain that the risk occurs when it happens — when it ceases to be a risk. Uncertainty cannot be eliminated, but it can be narrowed by:

- Clarifying the probability of occurrence of risk.
- Understanding the consequences or alternatives of the risk event happening.
- Determining what drives the risk — which factors influence its magnitude and likelihood of occurrence.

No matter how well you execute risk management, some risks will still occur. Uncertainty can only be reduced, not eliminated.

Do not confuse risk with issues, which are events that

The three components of a risk, which determine our ability to manage it.

Candidate — Uncertain? — Yes — Loss possible? — Yes — Time component? — Yes — Risk

No → Issue   No → No impact   No → Irresolvable

are certain to occur. Issues are just as important as risks, but you are aware of them before they arise and they are handled differently than risks.

What Is a Risk?

Risks always involve the possibility of loss. We manage risk because we do not want to suffer loss, even if it is a remote possibility. If there is no possibility of loss, there is no reason to manage the risk. Also consider the possibility that the outcome of certain risks might be a gain instead of a loss.

Be aware of the time component of risks. Eventually there comes a time when a risk no longer exists because you have suffered the loss, or the risk has been resolved to cause little damage. You must recognize when the risk is gone, so you can remove it from your agenda. Some risks have no time component and are ongoing. If that is so, they are more risks of being in business than risks of this particular project.

The authors: Preston G. Smith is the founder and principal of New Product Dynamics, and has been a product development consultant for over 18 years.

Guy M. Merritt is currently the staff program manager at Tellabs in Ashburn, Va., and was a leading contributor of Tellab's project risk management program.

For more information on the authors, go to:
http://my.summary.com

Risk and Risk Management

(continued from page 2)

Companies fail at risk management because they fail at one of the two fundamentals of managing risk well: **cross-functionality** and **proactiveness**.

Companies make the mistake of believing that innovation is only in R&D, and that is where most of the risk lies. However, most development project risks fall outside of R&D. Leaving all risk management in R&D will leave you wide open for most of your cross-functional risks.

Companies that are not proactive about risk management make two mistakes. They wait until late in the project when risks start occurring, and they let risk management lapse. **Risk management should begin early in the project and proceed as a monitoring and follow-up effort throughout.**

The opposite of risk management is firefighting. Good firefighters are reactive instead of proactive managers. They are regarded as heroes because they pull the problems out of the fire and are usually rewarded for it. Good risk management is rather dull, but reward should come from fire prevention. ■

> **For a glossary of terms to use when discussing risk, go to:**
> **http://my.summary.com**

Risk Models and the Standard Risk Model

Modeling risk allows you to quantify its magnitude so it can be compared to other risks to determine which ones need to be managed. It also points you toward root causes so you can effectively resolve the risk. Since people often disagree about what constitutes risk, models allow us to communicate risks to others and come to a common understanding. However, their weakness is that they show only a partial picture of reality.

When judging a risk model, be sure that it has a clear purpose, it is user-friendly to the intended audience, its framework is universal to maximize reuse potential, it allows independent users to develop similar results with the same input, and that output can be readily verified.

Components of the Standard Risk Model

The Standard Risk Model is the most helpful of the typical risk models for comprehending project risk and associated cost. The components of this model are:

● **Risk event:** the event that triggers a loss.

● **Risk event driver:** something within the project environment leading one to believe a particular risk event could occur.

● **Probability of risk event:** likelihood a risk event will occur.

The Standard Risk Model is the preferred technique to model project risks.
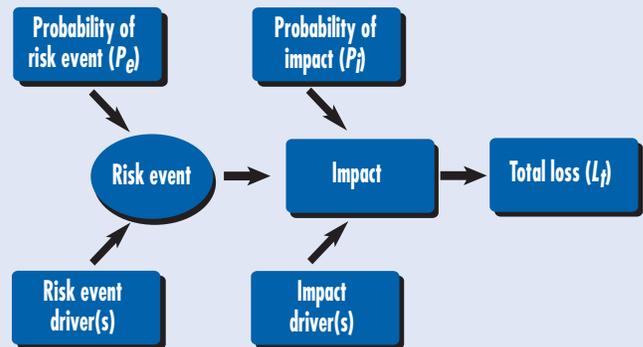
● **Impact (of a risk):** consequence or potential loss that might result from risk event.

● **Impact driver:** something within project environment leading one to believe a particular impact could occur.

● **Probability of impact:** likelihood impact will occur, given that risk event occurs.

● **Total loss:** magnitude of actual loss value accrued when a risk event occurs.

The Standard Risk Model shows how changing the drivers of a risk event can lower the probability, and changing the impact drivers can mitigate the total loss. It also shows a cause-and-effect relationship: Effectively managing or removing the risk event can change or prevent the impact and thus the total loss.

Make sure you use very specific information when developing the drivers that are critical to risk resolution planning. Broad generalizations in drivers makes risk management difficult. ■

OVERVIEW OF RISK MANAGEMENT PROCESS

Managing risk is a five-step process. Even if you streamline or modify the process for your own needs, you will still need to go through these five steps. ■

Step 1: Identifying Risks and Impacts

The first step is to identify risks. Instead of a separate step, planning risk management should be a natural part of project planning.

The identification process involves a brainstorming session run by a skilled, independent facilitator. Gather in a large room with plenty of wall space, paper, mark-

Step 1: Identifying Risks and Impacts
(continued from page 3)

ers and sticky notes. You should also have the business case for the project, product requirements or specifications, and any project-specific plans such as budgets, markets served and supply-chain partners.

Prepare a spreadsheet to log and track risks as you move through the five steps. It should include the following information, which will be filled in and tracked throughout the process: **risk identifier, risk owner, risk event, risk event driver(s), probability of risk event, impact, impact driver(s), probability of impact, total loss, risk likelihood, expected loss and priority.**

Include a diversity of opinions among team members, not just the engineers who will be designing your product. Representatives from sales, marketing, sourcing, production, quality and finance should also be involved in the brainstorming session. In addition to understanding your product development process, these people must understand the definition of risk and the components of the Standard Risk Model, so that they know to identify risks rather than issues. Each person must also understand the scope, features and novelties of both the project and the product before brainstorming begins.

Walk Through the Schedule

Get your group thinking creatively with some warm-up exercises that do not refer specifically to the project at hand. Then start identifying risks using whichever system works best for your organization over time. One effective way is to **use the project schedule as a catalyst**. Prepare a wall-sized version of the schedule that includes all departments, suppliers and partners involved and their respective steps in the process. Walk through the schedule constantly asking, "What could go wrong at this point in the project that would prevent us from achieving project success?" If everyone writes their risks on sticky notes and sticks them to the schedule you will not only see where the problems are, but where many risks pile up at one spot. Take all the sticky notes with risks and enter them in the database.

There are other ways to assess risks. The **development process-based method** is similar to the schedule-based system, but it uses a graphic depiction of the company's product development process on the wall, instead of the schedule. Because this is not specific to the project, it is important to be very explicit about the risks and their drivers through the process. For the **success-thwarting based method** have the team list five to seven characteristics that would describe success for the project, and then ask them what could go wrong to prevent these success outcomes. Be sure to assess the project from all angles. The **prompt-list based method**

requires looking at past projects and determining the areas where you made repeated mistakes. Then develop a prompt-list of possible risks to consider at the beginning of every project.

The facilitator should fully understand the risk management process, and must be able to navigate between people who detect no problems, and those who see them at every turn. It is also important to thwart the firefighters. The facilitator needs to correct these unproductive trends. ■

Step 2: Analyzing Risks

Most people end up with a long list of potential risks and then forget them, moving on to the "real work" of getting the project done. Then they are inevitably faced with risks they have already identified. The next step is to decide which risks are significant enough to manage actively. Ask the team to consider the following issues for each risk:

● Why do you believe the risk event and its impact will occur?
● What is the total loss if the risk event occurs?
● Why do you believe the total loss will be that amount?
● What are the subjective probabilities for the risk event and its impact?

It is important to understand the facts underlying a risk or you will be burdened with baseless risks and waste your time.

Establish the facts behind the risk drivers. A **risk driver** is something existing in the project environment that leads you to believe a particular risk event or impact could occur. The facts are the key to managing project risk successfully. A risk is that a prototype will be delivered late; the **fact** is that the prototype shop is overloaded due to an upcoming trade show. Do not try to manage a risk without understanding the facts that cause it.

Document Each Risk

Start your risk analysis workshop with the same facilitator and have each risk documented on the spreadsheet including **risk identifier, risk owner, risk event** and **impact**. The workshop will allow the team to understand which risks are real and what their consequences could be. The facilitator will ask questions to uncover all possible sources of risk events and impact drivers.

Develop risk event drivers by finding out why the originator of the risk event thought it was important.

Step 2: Analyzing Risks
(continued from page 4)

Rely only on facts. If people can only provide opinions based on assumptions, consider the same risk event with different drivers. Enter true, factual risk event drivers into the spreadsheet. Next, **develop impact drivers**. They should answer which project facts make the impact more or less likely to occur and which project facts establish the magnitude of the total loss. The impact is the possible consequence if the risk event occurred.

Next, **quantify the total loss** — what would be the total amount lost if a risk event occurs. The total loss is measured in time or money. For instance an impact might be that "the delivery date will slip by 15 workdays." The total loss is 15 workdays. Be consistent with the loss unit through the entire process. If people find themselves disagreeing about the value of the total loss is it likely that you have not developed good impact drivers.

Since total loss will be used to prioritize risk, if you absolutely cannot determine a total loss for a risk on the critical path of your project, you must red flag that risk for special management. But this should be a rare occurrence. It is possible to use qualitative or quantitative measures to determine total loss, but most people can relate to time, so workdays are an effective measure. Qualitative measures will be hard to track and calibrate over the whole process.

Calculate The Risk

With the total-loss figures, it is time to estimate the risk more precisely than noting that a project seems "risky." Begin by calculating the **risk likelihood** by multiplying the probability of the risk event and the probability of its impact.

It is not necessary to be precise with probabilities. Make educated guesses. Assign a probability, usually subjective, to the risk event and to the impact of each risk. Remember that the probabilities refer to the risk event drivers and impacts, not the risk events. If a risk event driver has a 100 percent probability of happening, it is not a risk; it is an issue that needs immediate attention. Allow 100 percent probability for impacts, because

it is completely possible for an impact to be a certainty.

Once you have your risk likelihood, calculate your expected loss for each risk by multiplying the risk likelihood by the total loss. This is the average loss you can expect from the risk (see below). ■

For sample questions to discover risk event and impact drivers, go to: http://my.summary.com

Step 3: Prioritizing and Mapping Risks

By prioritizing risks, you will impose order on the long list of risks, and will plan to address only those that pose the greatest threat to the project's goals.
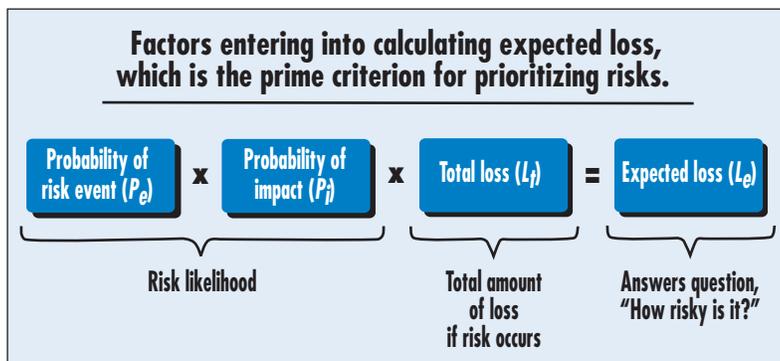
You have already determined the expected loss for each risk, which is a measure of the overall severity. You can rank the expected loss values on the spreadsheet; keeping in mind that the risk data you developed was subjective. If you used different units for the expected loss, you will have to compensate for that in the spreadsheet. Some catastrophic risks might be considered higher priority. The team will then work together to prioritize which risks should be actively managed.

After sorting risks by expected loss, develop a risk map. A risk map is a graph that plots risks using total loss on the x-axis and risk likelihood (probability of risk event times probability of impact) on the y-axis. Then draw the curve threshold line of constant expected loss that divides the risks you will manage actively from those that will not be managed. If you quantified all risks on a single scale, the line can be plotted from the following formula where Le is chosen level of expected loss and Lt is total loss: **P = Pe x Pi =Le/Lt.** If you use qualitative measures, you will have to calculate different thresholds and draw an average.

Tolerance and Threshold

Place the threshold line on the graph with respect to your tolerance for risk. A higher tolerance for loss should move your line higher up, and you will have fewer risks above it to manage. The curve's location should take into account the trade-off between managing too few risks which could open the door for downstream surprises and managing too many, which will consume project resources.

You will manage the risks above the threshold, except in two cases. You may choose not to manage low-loss risks with relatively small impacts and you may choose to manage catastrophic risks that have likelihoods placing them below the threshold line. Designate which risks are **active** and **inactive** on the spreadsheet.

Factors entering into calculating expected loss, which is the prime criterion for prioritizing risks.

Probability of risk event (P_e)	x	Probability of impact (P_i)	x	Total loss (L_t)	=	Expected loss (L_e)
Risk likelihood				Total amount of loss if risk occurs		Answers question, "How risky is it?"

Step 3: Prioritizing and Mapping Risks
(continued from page 5)

Now sort the spreadsheet by risk status (active or inactive) and then by expected loss. The inactive risks will simply be monitored with the implied acceptance that there will be some unmanaged risk events. However, you are managing actively the risks that could do the most harm to the project.

Using your sorted risk list and your risk map, you and your team should now determine a priority ranking, which will be listed in the spreadsheet. The number you can manage effectively is likely around 10.

The final step in prioritizing is to communicate the prioritized list to alleviate discomfort over the fact that you are leaving recognized risks unmanaged. Ensure that everyone connected with the project understands the team's decisions and why they were made. The best way to do this is with a risk management review including the project managers and design team. ∎

For a risk map showing risks under active management, go to:
http://my.summary.com

Step 4: Planning Resolution

With a top-10 list of your most critical risks, you are ready to formulate action plans to deal with each active risk, reducing the probability of the risk event and reducing its damage if it does occur. Action plans are designed to change the risk drivers to the point that they no longer drive the likelihood of the risks. Risk management is about dealing with risk drivers, not risks. These action plans become tasks within the overall project and are just as important as other project tasks.

When resolving risks you can develop an action plan, take no action — accepting the risk — or defer action until you have more information. If you defer, you should assign a deadline to make a plan, so it does not become taking no action.

Making an action plan is usually a cyclical process of forming plans and assessing them based on criteria such as effectiveness, implementation time, or political expediency. You will probably develop one plan and a contingency for each risk, but you might not even find a plan whose benefits exceed their cost. Then you have to accept the risk. If you accept a risk, you should establish a reserve of money or schedule slack equal to the residual expected loss.

Assign Task Owners

The facilitator should assign a risk owner for each risk, who will develop the action plan, often with a subteam. This team will likely take one of four steps to manage the risk:

1. Avoid the risk by reversing the decision that caused the risk, without becoming risk averse. Sometimes risks are unnecessary because they provide no benefit, so the decision to take them can be reversed.

2. Transfer the risk to another entity. This often happens when a team realizes it does not have the expertise to reach a deadline, so it transfers the project and the risk to someone with more experience.

3. Provide redundant paths to increase the likelihood of success. These are essentially backup plans in case the first plans don't work.

4. Mitigate the risk by developing prevention and contingency plans to make it less severe.

Mitigation

Mitigation is the mainstay of effective risk management. It directly counters the effects of risk events and impact drivers, and is usually quite obvious if high-quality drivers have been articulated.

Mitigation actions should define trigger points that start preparations and actions. The trigger points are key and can be dates, project milestones or conditions. They signal to everyone that an action is about to commence.

Mitigation actions include **prevention plans**, which decrease the probability of the risk event and the expected loss; **contingency plans**, which act on impact drivers to reduce the probability of the impact; and **reserves**, which guard against risks with unknown magnitude and perhaps even unknown existence. Setting reserve levels is hard, but history should be a good determinant.

Remember as you proceed with action planning that you will be spending resources, financial or human, to prevent or deal with risk. This is the point where you should explicitly analyze the balance between implementing and executing prevention and contingency and the benefits received. ∎

For the criteria that mitigation actions should meet, go to:
http://my.summary.com

Step 5: Monitoring Project Risks

This last step of the risk management process is ensuring that action plans are progressing properly, that successful plans are retired, and that any significant new or growing risks are taken under management. Here is where many organizations fail and let the whole process fall apart. In this step you will add two more risk status designations to active and inactive: **issue** and **closed**.

Step 5: Monitoring Project Risks
(continued from page 6)

Risk status changes to issue when the risk event happens despite prevention plans. Issue management is implementation of contingency plans to mitigate total loss. Risk status is closed when the risk event has been prevented and the time has passed when it can occur or when it has become an issue and been managed with a contingency plan.

Throughout this project, the spreadsheet you began with will be very helpful to track risks and their changing status. The spreadsheet should include two summary worksheets: one to show the top-10 list of risks, another to show a "risk dashboard" of tactical metrics to track progress through the project. There should be one worksheet for each active risk and its action plan and one worksheet for each inactive risk without an action plan.

You can also use a Web-based tool to make it easier for team members to track. You should be able to look at the inactive risks and determine whether they need to be activated.

All action plans and contingency plans should be monitored by reporting on activity and status, and by keeping an overall map of progress. Do not allow this process to be ignored. Quantify progress by the change in the drivers and how they affect the risk's possibilities.

You should also consider when plans should be closed, because risk management costs resources. There is no point in continuing the plans beyond when they are necessary. If a prevention plan has eliminated the possibility of risk, then you can close the contingency. If you close a prevention plan that has reduced but not eliminated the risk, you must decide whether to keep the contingency plan.

Watch Out for New Risks

Always be on the lookout for new risks, especially if there are changes in the product requirements or specifications. These new risks often extend beyond the apparent change to disrupt completed parts of the project.

When the team discovers a new potential risk, it should be entered in the original spreadsheet, and a small group should use a condensed version of the process to determine whether it should be actively managed. Once you have discovered a new risk or decided that an inactive risk should become active, implement a new action plan by assigning a small team to deal with it, fit the plans into your task structure, and obtain additional resources.

Communication will be key in this step. Emphasize all elements of communication — sender, message, receiver and feedback — to ensure effective risk communications. Do not let all communication be about cri-

sis situations. Communicate about preparing for the future and averted risks. The project manager should use meeting minutes, risk-tracking spreadsheet and the risk map as the primary communication tools.

Risk Management Metrics

Use metrics responsibly. They should not encourage distrust and cynicism. Collect them openly, share the results, discuss the implications, and take action on the findings. Once you start sharing metrics, people will naturally change their behavior to improve their numbers. Think about metrics carefully so they cannot be manipulated for individuals' personal objectives.

There are two types of metrics you should use: **strategic** and **tactical**. Strategy metrics detect long term changes and ensure improvements are not forgotten. They are also useful for measuring schedule and budget performance relative to plan. Use more specific metrics such as risks identified and averted due to risk management and risks that went unidentified but later occurred.

Tactical metrics are used throughout the project to track active and inactive risks and the losses accumulating from them. Only use a few and keep them on a risk management dashboard so they are easy to comprehend. ■

For specific examples of tactical risks to keep on a "risk dashboard," go to: http://my.summary.com

Risk Management Toolkit

As you move through the process of risk management, there are many tools that may help support the process.

Sticky density is useful for pinpointing risky areas in a process, project or organization. It was introduced in the risk identification workshop and can be used to find risks or to determine root causes. Using a large diagram of the process, have people write their issues on a sticky and put them on the model. The areas with the highest sticky density are areas for concern and focus.

Spreadsheets can be used in countless ways to organize, analyze and present your project risk data. In addition to tracking the entire risk management process, having all of the information in a spreadsheet allows you to make charts and graphs easily.

Decision analysis helps clarify situations involving uncertainty. Using a standard decision tree, you can think through a situation and break it down into various decisions and probabilities to determine which choice to make. Decision analysis is useful when:
- It is easier to estimate components than the composite.
- There is uncertainty, confusion or disagreement regarding underlying structure or options.

Risk Management Toolkit

(continued from page 7)

- Consequences of an error in assessment could be catastrophic.
- You need another way to approach a situation when you have reached an impasse.
- You suspect you are not considering everything or have a bias.

Risk simulation allows you to see the overall effects of multiple risks. Instead of developing a total loss value with a single probability, risk simulation tools allow you to use probability curves for individual tasks. Commercially available computer programs pick numbers at random within your probability curves and plug them into all of the probabilities of risk you have created. After multiple simulations you will receive a representative picture of the many possible outcomes.

A **design structure matrix** (DSM) helps unravel the iterative processes that occur in product development where you don't have information until after you need it. It analyzes a sequence of project activities to manage the not-yet-available information. DSM helps you reduce iteration to a minimum. ∎

Risk Management Approaches And Strategies

In order to implement the process, your company may need to make certain changes in attitude and behavior.

Learn to **avoid risk** when it is unnecessary. For example, have management encourage and reward designers who use standard parts or reuse successful part designs in new products to reduce design risk. **Plan on redundancy** or parallel design efforts if you can narrow a risk down to two possible solutions, but cannot make a decision. Obviously this is an expensive option to be used rarely, but keep both options open so that you do not make a wrong decision.

Maintain contact with customers to find out what they need before designing a product and during development. Either send design engineers into the field or use your customer service staff to gain this knowledge.

Though human nature is to begin with the easiest when faced with an assortment of tasks, **tackle the highest-risk items first**. These are the ones that will most likely derail your project, so if they cannot be solved, cancel the project before wasting resources on the easy issues. Also, try to **concentrate risk** in a few known areas where they can be watched carefully by your best developers. Spreading risk out over different steps or modules of a plan increases the overall chance that you will not achieve your final goal.

Test at the lowest possible level. Test components and subsystems to answer questions that arise from your risk action plans. Do not wait until the end of the project to find out if something works. And finally, **use failure to your advantage** by using product development as a learning process. Do not be afraid of failures along the way, because you will most likely learn something from them to improve this project or the next one. ∎

Successful Implementation

Do not expect to implement this process with one project and have it spread to the rest of the company. Proactive risk management will only take root if team members and management change their behavior.

If you are serious about implementing risk management, you must fit it into your entire project management process. A risk management workshop should occur some time during the project initiation phase, and continued management should be integral to all project phases and be treated just as seriously as project scope, budgeting, scheduling and resource allocation.

You will also need to provide data management tools for tracking the substantial amount of data as you move through the process. The tools should be uniform and consistent to make implementation easy. ∎

Implementation Guidelines

- Train your people to use terms consistently, since everyone's perception of risk is different.
- Make risk a concern of management by training them to understand and interpret the prioritized risk list, the risk map and the risk dashboard.
- Take potential problems seriously, instead of only focusing on active problems.
- Risk management requires honesty.
- Do not let engineers run project risk management. Good risk management is cross-functional.
- Collect and publicize risk metrics.
- Jump right in while all of these techniques are fresh in your mind.
- Project risk management is not a cure-all, though it can make improvements in your projects' predictability.
- Consider risk as an opportunity for gain as well as a potential for loss.