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Identifying and Managing Project Risk ● TOM KENDRICK, PMP ● 2015

Identifying Project Scope Risk

"Well begun is half done."
—ARISTOTLE

Sources of Scope Risk
Change Risks (Scope gaps, Scope creep, Scope dependencies)
Defect Risks (Software problems and hardware failures, Integration defects)

Defining Deliverables
Requirements Management

Topics for a typical deliverable definition process are:

1. Alignment with business strategy: How does this project contribute to stated high-level business objectives?
2. User and customer needs: Has the project team captured the ultimate end user requirements that must be met by the deliverable?
3. Compliance:Has The Team Identified All Relevant Regulatory, environmental, and manufacturing requirements, as well as any relevant industry standards?
4. Competition:Has the team identified both currentand projected alternatives to the proposed deliverable, including not undertaking the project?

5. Positioning:Is There A Clear And Compelling Benefit-oriented project objective that supports the business case for the project?
6. Decision criteria: Does this project team have an agreed-upon hierarchy of measurable priorities for cost, time, and scope?

7. Delivery:Are Logistics Requirements Understand And

Manageable? These include, but are not limited to, sales, distribution, installation, sign-off, and support.

8. Sponsorship:Does The Management Hierarchy Collectively support the project, and will they provide timely decisions and ongoing resources?

9. Resources:Does The Project Have, and will it continue to have, the staffing and funding needed to meet the project goals within the allotted time?

10. Technical risk: Has the team assessed the overall level of risk it is taking? Are technical and other exposures well documented?

Agile and Iterative Methods

Whatever it may be called or be a part of, an effective definition for project requirements must be in writing.
Specific information typically includes:

• A description of the project: What are you doing?
• Project purpose: Why are you doing it?
• Measurable acceptance and completion criteria: What does "done" look like?
• Planned project start
• Expected deadline and any other timing constraints
• Cost expectations (at least a rough order of magnitude) and budget constraints
• Intended customer(s) or users
• What the project will and will not include (is/is-not)
• Dependencies (both internal and external)
• Staffing requirements (in terms of skills and experience)
• High-level risks
• Technology required
• Hardware, software, or other infrastructure required
• Detailed requirements, outlining functionality, usability, reliability, performance, supportability, and any other significant issues
• Other data customary and appropriate to your project

High-Level Risk Assessment Tools

Risk Framework
• Technology (the work)
• Marketing (the user)
• Manufacturing (the production and delivery)

Risk Complexity Index

Index = (Technology + Architecture + System) × Scale

For this index, Technology is defined as the basis for development used on the project. Architecture refers to high-level functional components and any external interfaces, and System is the internal software and hardware that will be used in the product.

Assess each of these three against your experience and capabilities, assigning each a value from 0 to 5:
• 0: Only existing technology required
• 1: Minor extensions to existing technology needed in a few areas
• 2: Significant extensions to existing technology needed in a few areas
• 3: Almost certainly possible, but innovation needed in some areas
• 4: Probably feasible, but innovation required in many areas
• 5: Completely new, technological feasibility in doubt

The three technology factors will generally correlate, but some variation is common.
Add these three factors, to a sum between 0 and 15.

For Scale, assign a value based on the number of people (including all full-time contributors, both internal and external) expected on the project:
• 0.8: Up to 12 people
• 2.4: 13 to 40 people
• 4.3: 41 to 100 people
• 6.6: More than 100 people

The calculation for the index yields a result between 0 and 99. Projects with an index below 20 are generally low-risk projects with durations of well under a year. Projects assessed between 20 and 40 are medium risk. These projects are more likely to get into trouble, and often take a year or longer. Most projects with an index above 40 are high risk, finishing long past their stated deadline, if they are completed at all.

Work Breakdown Structure

Scope definition reveals some risks, but scope planning digs deeper into the project and uncovers even more. Product definition documents, scope statements, and other written materials provide the basis for decomposing of project work into increasingly finer detail, so it can be understood, delegated, estimated, and tracked. The process used to do this—to create the project work breakdown structure (WBS)—reveals potential defect risks.

Work Packages
Aggregation
Ownership

WBS Size

Project risk correlates with size; when projects get too large, risk becomes overwhelming. Scope risk rises with complexity, and one measure of complexity is the size of the WBS. Once you have decomposed the project work, count the number of items at the lowest level. When the number exceeds about 200, project risk is high.

Other Scope–Related Risks

Market Risk
Confidentiality Risk

Documenting the Risks

Sources of specific scope risks include:
• Requirements that seem likely to change
• Mandatory use of new technology
• Requirements to invent or discover new capabilities
• Unfamiliar or untried development tools or methods
• Extreme reliability or quality requirements
• External sourcing for a key subcomponent or tool
• Incomplete or poorly defined acceptance tests or criteria
• Technical complexity
• Conflicting or inconsistent specifications
• Incomplete product definition
• Large WBS

Key Ideas for Identifying Scope Risks

• Clearly define all project deliverables, and note challenges.
• Set limits on the project based on the value of the deliverables.
• Decompose all project work into small pieces, and identify work not well understood.
• Assign ownership for all project work, and probe for reasons behind any reluctance.
• Note risk arising from expected project duration or complexity.

Identifying Project Schedule Risk

Work expands so as to fill the time available for its completion.
—C. NORTHCOTE PARKINSON, PARKINSON'S LAW

Most people who are drawn to these complex projects are analytical, and they like to be precise, accurate, and thorough. If there is time avail- able to attempt to make something perfect, most engineers will try. Projects, however, are rarely about perfection. They are about pragmatism, delivering a result that is "good enough."

Schedule risk cases make up slightly less than 30 percent of the records in the PERIL database.

Delay Risks
Estimating Risks
Dependency Risks

Activity Definition
Estimating Activity Duration

Estimation Pitfalls

Estimation Techniques

Good estimating is based on:
• Historical data
• Experts and expert judgment
• Experience-based rules and parametric formulas
• Relative size or scale assessment
• Delphi group estimating
• Further decomposition

Interfaces

Dependency risks outside the project are also substantially represented in the PERIL database. Dependencies of all kinds may rep- resent schedule risks, but interfaces—dependencies that connect one or more projects—are particularly problematic; the impact of these risks was among the highest for all schedule risks in the PERIL database, averaging almost eight weeks per project. Connections between projects are most common for projects that are part of a larger program. As each project team plans its work, dependencies on other projects are discovered and must be planned and managed. Dependencies that are wholly within a project carry schedule risk, but interfaces are even riskier. For a schedule interconnection, each project contains only half of the linkage, either the predecessor or the successor activity. The deliverables can be components, services, information, software, or almost anything that one project creates that is required as input by another project. The project that expects to receive the deliverable potentially faces both schedule and scope risks. If the handoff is late, the dependent project could slip. Even when it is on time, if the deliverable is not acceptable, the project (and the whole program) may be in trouble. Interfaces are particularly important to identify and manage because of the limited visibility of progress across separately managed projects.

The process for managing these interfaces and the risks related to them is best managed at the program level, and it is described in Chapter 13 in the section on program risk management.

Interface management requires agreement and commitments in writing between each involved project, and even then, it's risky. Add each interface dependency for your project to your list of project risks.

Key Ideas for Identifying Schedule Risks

- Determine the root causes of all uncertain estimates.
- Identify all estimates not based on historical data.
- Note dependencies that pose delay risks, including all interfaces.
- Identify risky activities and schedule them early in the project.
- Ascertain risks associated with multiple critical (or near critical) paths.
- Recognize the riskiest dependencies at fan-in points in the project schedule.
- Note risks associated with lengthy projects.

Identifying Project Resource Risk

If you want a track team to win the high jump,
you find one person who can jump seven feet,
not several people who can jump six feet.
—FREDERICK TERMAN,
STANFORD UNIVERSITY DEAN AND PROFESSOR OF ENGINEERING

Resource risks are the next most numerous and damaging after scope risks. They represent a bit more than 30 percent of the records in the PERIL database.

People Risks
Risks related to people represent the most numerous resource risks, constituting nearly 20 percent of the entire database and over half of the resource category.

Outsourcing Risks
Money Risks
Black Swans

Resource Planning

Staff Acquisition
Skill Requirements

Key Ideas for Identifying Resource Risks

• Identify all required skills you need for which you lack named, committed staffing.
• Determine all situations in the project plan where people or other resources are overcommitted.
• Find all activities with insufficient resources.
• Identify uncertain activity effort and cost estimates.
• Note outsourcing risks.
• Gain funding approval early for needed training, equipment purchases, and travel.
• Ascertain all expected project costs.

Managing Project Constraints and Documenting Risks

A good plan, violently executed right now, is better than the perfect plan executed next week. —GENERAL GEORGE S. PATTON

Analyzing Constraints

Seeking Missing Risks
Brainstorming
Retrospective Analysis
Scenario Analysis
Assumptions Analysis
SWOT Analysis
Expert Interviews
Root Cause Analysis
Bow Tie Analysis
Other Risks and Risk Breakdown Structure Analysis
Value Analysis and ROI Risk

Creating a Risk Register

• A clear risk description
• Probability assessment
• Impact estimate
• Overall rating
• Impact description, including when the risk would most likely occur
• Risk owner
• Triggers or other indicators that signal risk occurrence
• Response summary
• Contingency or recovery summary

Key Ideas for Constraint Management and Risk Discovery

• Minimize differences between project plans and objectives.
• Understand and clearly document project priorities.
• Explore project opportunities.
• Use priorities to identify project alternatives.
• Identify and explicitly remove unnecessary project scope.
• Determine risks and costs of proposed plan revisions.
• Minimize unknown risk through brainstorming, analysis, and research.
• Thoroughly document known project risks.

Quantifying and Analyzing Activity Risks

When you know a thing, to hold that you know it, and when you do not know a thing, to allow that you do not know it—this is knowledge. —CONFUCIUS

Qualitative and Quantitative Risk

Analysis – Uses for Qualitative Assessment,
Uses for Quantitative Assessment, Precision and Bias

Probability and Impact - Risk Probability

- High: 50 percent or higher (likely)
- Medium: Between 10 and 50 percent (unlikely)
- Low: 10 percent or lower (very unlikely)

Risk Impact

- High: Project objective is at risk (mandatory change to one or more of scope, schedule, or resources).
- Medium: Project objectives can be met, but significant replanning will be required.
- Low: No major plan changes; the risk is an inconvenience, or it will be handled through overtime or other minor adjustments.

- Very low: Less than 1 percent impact on scope, schedule, cost, or quality
- Low: Less than 5 percent impact on scope, schedule, cost, or quality
- Moderate: Less than 10 percent impact on scope, schedule, cost, or quality
- High: Less than 20 percent impact on scope, schedule, cost, or quality
- Very high: 20 percent or more impact on scope, schedule, cost, or quality

- Personal consequences
- Career penalties
- Loss of team productivity
- Team discord
- Organizational impact
- Business and financial consequences

 Marital problems, divorce, and personal relationship troubles
- Cancelled vacations
- Missed family activities
- Excessive unpaid overtime
- Fatigue and exhaustion
- Deterioration of health
- Exposure to unsafe conditions, poisonous or volatile chemicals, dangerous environments, or undesirable modes of

travel
- Loss of face, embarrassment, lowered prestige, bruised egos, and reduced self-esteem
- Required apologies and groveling

- Job loss
- Lowered job security
- A bad performance appraisal
- Demotion
- No prospect for promotion

- More meetings
- Burnout
- Increased communication overhead, especially if across multiple time zones
- Added stress, tension, pressure
- More errors, inaccuracies
- Chaos, confusion
- Rework
- Additional reporting, reviews, interruptions
- Individuals assuming responsibility for work assigned to others
- Exhaustion of project reserves, contingency

- Conflict, hostility, resentment, and short tempers
- Lack of cooperation and strained relationships
- Low morale
- Frustration, disappointment, and discouragement
- Demoralization and disgruntlement

Project risk consequences may lead to organizational impact that extends well beyond your current project's prospects for success.
- Delayed concurrent projects
- Late starts for following projects
- Resignations and staff turnover
- Loss of sponsor (and stakeholder) confidence, trust, and goodwill
- Questioning of methods and processes
- Ruined team reputations

- Micromanagement and mistrust by supervisors
- Required escalations and expediting of work
- The need to get lawyers involved

- Loss of business to competitors and competitive disadvantage
- Bad press, poor public relations, and loss of organizational reputation
- Customer dissatisfaction and unhappy clients
- Loss of future business and lowered revenues
- Reduced margins and profits
- Loss of client trust and confidence
- Complications resulting from failure to meet legal, regulatory, industry standards, or other compliance requirements
- Damaged partner relationships
- Reduced performance of the project deliverable
- Compromised quality or reliability
- Rushed, inadequate testing
- Missed windows of opportunity
- Continued cost of obsolete systems or facilities
- Inefficient, unpleasant manual workarounds
- Service outages and missed service-level agreements
- Bankruptcy and business failure (if the project is big enough)

Risk Impact Criteria

Very Low - Any impact that can be handled within a single status cycle and would likely not be visible outside the project team

Low - Any impact that can be dealt with within the project team and having no anticipated long-term effects

Moderate - Any impact that would result in significant project replanning or that could lead to a noticeable and inconvenient effect for the organization

High - Any impact that would threaten the project's objective (failure to meet one or more of the project's triple constraint parameters) or that might lead to significant, measurable longer-term business impact for the organization

Very High - A project "showstopper" that would result in cancellation, or a risk that has potential for overall long-term business impact in excess of the project's budget

Qualitative Risk Assessment. **Risk Assessment Tables**

Qualitative risk assessment based on categorization of both probability and impact provides greater insight into the absolute risk

Key Ideas for Activity Risk Analysis
• Assess probability and impact for each project risk.
• Understand and work to minimize biases.
• Use qualitative risk analysis to prioritize risks.
• Apply quantitative risk analysis techniques to better understand significant risks.
• When using PERT or related techniques, keep things simple.

Managing Activity Risks

Root Cause Analysis
Categories of Risk
Selecting Risks to Address

Risk Response Planning

Risk Response Techniques

Dealing with the causes of project threats involves risk prevention — eliminating the risk (avoidance), lowering its probability or potential impact (mitigation), or making it someone else's problem (transfer).
Timeline for Known Risks

Dealing with Risk Causes

Risk Avoidance

Tactics for avoiding scope risks suggested by the material in Chapter 3 include:

• Identify the minimum acceptable deliverable; avoid overdesign (gold plating).
• Negotiate and clearly document all interface deliverables expected from other projects.
• Avoid untried, unfamiliar, or "bleeding-edge" technology whenever practical.
• Plan to design using standard, modular, or well-understood methods; look for ways to achieve project specifications using older, tried-and-true technologies.
• Buy instead of make.
• Avoid not-invented-here thinking; be willing to leverage work done by others.

Many of your schedule risks are consequences of planning. You may be able to remove sources of schedule risk using ideas covered in Chapter 4:
• Reduce the number of critical paths.
• Modify the work to have fewer activity dependencies.
• Schedule the highest uncertainty activities as early as possible.
• Avoid having the same staff members working on two successive or concurrent critical (or near critical) activities.
• Decompose lengthy activities further.
• Reschedule work to provide greater flexibility.
Resource risks may also be a consequence of choices you made in resource planning. Explore opportunities to avoid these risks using the concepts of Chapter 5:
• Obtain names for all required project roles.
• Get explicit availability commitments from all project staff (and from their managers).
• Work to limit commitments by project staff to other projects, maintenance and support work, and other time conflicts. Explicitly document those that remain.
• Modify plans to reduce the load on excessively committed staff.
• Use the best people available for the most critical activities.
• Educate team members to use more efficient or faster methods, and do it early in the project.
• Use mentoring to build teamwork and establish redundancy for critical skills.

- Upgrade or replace older equipment to make work more efficient, and do it at the project start.
- Automate manual work when possible.
- Locate and gain access to experts to cover all skill areas not available on the project team.
- Minimize dependence on a single individual or other resource for project work.
- When you use outside services, use the same suppliers that you (or others that you trust) have used successfully in the past.
- Establish contract terms with all suppliers that are consistent with project objectives.

Mitigation strategies for scope risks.

- Explicitly specify project scope and all intermediate deliverables, in measurable, unambiguous terms, including what is not in the deliverable. Eliminate wants early—make them explicitly part of scope or drop them.
- Gain acceptance for and use a clear and consistent specification change control process.
- Adopt iterative or agile methods to manage scope based on user feedback and current priorities.
- Build models, prototypes, and simulations, and get user and stakeholder feedback.
- Test with users, early and often.
- Schedule risk-prone, complex work early.
- Obtain funding for any required outside services.
- Translate, competently, all project documents into relevant languages.
- Minimize external dependency risks.
- Consider the impact of external and environmental problems.
- Keep all plans and documents current.

Mitigation strategies for schedule risks.

- Use expected estimates when worst cases are significant.
- Schedule highest-priority work early.
- Manage external dependencies proactively.
- Before adopting a new technology, explore possibilities for using older methods.

- Use parallel, redundant development.
- Send shipments early. Avoid reliance on just-in-time.
- Know customs requirements and use experienced services for international shipments.
- Be conservative in estimates for training and new hardware.
- Break projects with large staffs into parallel efforts.
- Partition long projects into a sequence of shorter ones.
- Schedule project reviews.
- Reschedule work coincident with known holidays and other time conflicts.
- Track progress with rigor and discipline, and report status frequently.

Mitigation strategies for resource risks. Mitigating resource risks includes ideas such as:
- Avoid planned overtime.
- Build teamwork and trust on the project team.
- Use expected cost estimates where worst-case activity costs are high.
- Obtain firm commitment for funding and staff.
- Keep customers involved.
- Anticipate staffing gaps.
- Minimize safety and health issues.
- Encourage team members to plan for their own risks.
- Delegate risky work to successful problem solvers.
- Rigorously manage outsourcing.
- Detect and address flaws in the project objective promptly.
- Rigorously track project resource use.

Risk Transfer

Dealing with Risk Effects
Documenting Your Risk Plans and Risk
Owners

Maintain your risk register as part of your overall risk management plan, and use it to monitor risks. For each risk listed, include:
- A detailed description of the risk
- The risk owner, plus any others with assigned roles and

responsibilities
• The activities affected by the risk (including WBS codes)
• Any qualitative or quantitative risk analysis results (probability, impact, and overall assessment)
• A summary of risk response actions in the project plan
• The risk trigger event
• Expected residual risk exposure
• A summary of contingency and fallback plans

Bow Tie Analysis for Documenting Risk Responses