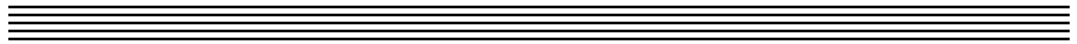


Special Report
CMU/SEI-94-SR-5
July 1994

Team Risk Management: A New Model for Customer-Supplier Relationships



Ronald P. Higuera
Audrey J. Dorofee
Julie A. Walker
Ray C. Williams

Team Risk Management Project

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Carnegie Mellon University
Pittsburgh, Pennsylvania 15213

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July 1994

This report was prepared for the

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The ideas and findings in this report should not be construed as an official DoD position. It is published in the interest of scientific and technical information exchange.

Review and Approval

This report has been reviewed and is approved for publication.

FOR THE COMMANDER

(signature on file)

Tom Miller, Lt Col, USAF
SEI Joint Program Office

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Overview

- Introduction** The Software Engineering Institute (SEI), a federally funded research and development center and part of Carnegie Mellon University in Pittsburgh, Pennsylvania, has been formally studying and developing risk management concepts since January 1990 as an efficient means to improve the success of programs developing software-intensive systems.
- Team Risk Management is a new paradigm for managing programs or projects by developing a shared product vision, focused on results, and using the principles and tools of risk management to cooperatively manage risks and opportunities.
- Purpose** This report will familiarize you with the concept of Team Risk Management by providing a description of the overall process that engages both the customer and supplier in a cooperative framework using explicit methods to manage project risks.
- Objectives** After reading this report you should be able to
- understand the Team Risk Management concept
 - differentiate Team Risk Management from risk management
 - answer the question, “Is it useful to me?”
 - know what is required to initiate Team Risk Management
- Benefits** Your organization or project will derive the following benefits from Team Risk Management.
- Improve customer-supplier and internal communication.
 - Use a concise approach and systematic discipline that carries over to other activities.
 - Enable your program or project to face issues that before tended to be too abstract to handle.
 - Improve design and fundamentally alter development decisions.
 - Provide more focus to program or project activity.
 - Increase product development predictability – reduce surprises.

In This Report

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Risk Terms and Definitions

Background	<p>There are a number of definitions and uses for the term risk, but no universally accepted definition.</p> <p>What all definitions have in common is agreement that risk has two characteristics [Kirkpatrick 92, p.7]:</p> <ul style="list-style-type: none">• uncertainty - an event may or may not happen• loss - an event has unwanted consequences or losses
Rowe Definition	<p>Risk is the potential for realization of unwanted negative consequences of an event [Rowe 88, p. 24].</p>
Lowrance Definition	<p>Risk is the measure of the probability and severity of adverse effects [Lowrance 76, p. 94].</p>
Webster's Definition	<p>Risk is the possibility of suffering loss, injury, disadvantage, or destruction [Webster's Dictionary 81, p. 1961].</p>
SEI Definition	<p>The SEI uses the Webster's definition of risk.</p> <p>Risk is the possibility of suffering loss.</p> <p>In a development program, the loss could be in the form of diminished quality of the end product, increased costs, delayed completion, or failure.</p>
SEI Statement of Risk	<p>For a risk to be understandable, it must be expressed clearly. Such a statement must include</p> <ul style="list-style-type: none">• a description of the current conditions that may lead to the loss• a description of the loss

Example of Risk

Company XYZ has just introduced object-oriented technology into its organization. They see this new technology as having considerable competitive advantage in the future because of its potential for asset reuse in their major product lines. Although many people within the organization are familiar with the technology, it has not been part of their development process, and their people have very little experience and training in the technology's application.

The risk is: Given the lack of experience and training, there is a possibility that asset reuse will not be realized before losing market share.

Non-Example of Risk

Company ABC is developing a flight control system. During system integration testing the flight control system becomes unstable because processing of the control function is not quick enough during a specific maneuver sequence.

This is not a risk since the event is a certainty – it is a problem.

Team

A **team** is a small number of people with complementary skills who are committed to a common purpose, set of performance goals, and approach for which they hold themselves mutually accountable [Katzenbach 93, p. 112].

Example of Team

An integrated product team includes representatives from developer, marketers, customers, and users all working toward and accountable for the successful development of a product on time and within budget.

Customer

The term **customer** refers to the organization acquiring systems (typically designated as **programs** or **projects**) and is responsible for

- defining the requirements
- obtaining funding
- selecting the supplier/contractor
- negotiating the contract
- accepting the product [Kirkpatrick 92]

In this report, the term **government** is used as a specific example of a customer.

Note: **Project** and **program** are considered synonymous terms in this report.

Supplier

The term **supplier** refers to the organization developing and producing the system and is responsible for implementing the requirements under the terms of the contract, which include cost and schedule [Kirkpatrick 92].

In this document, the term **contractor** is used as a specific example of a supplier.

Risk Management

Background

The term **risk management** is applied in a number of diverse disciplines. People in the fields of statistics, economics, psychology, social sciences, biology, engineering, toxicology, systems analysis, operations research, and decision theory, to name a few, have been addressing the field of risk management [Kirkpatrick 92, p. 8].

Kloman summarized the meaning of risk management in the context of a number of different disciplines in an article for *Risk Analysis*:

What is risk management? To many social analysts, politicians, and academics it is the management of environmental and nuclear risks, those technology-generated macro-risks that appear to threaten our existence. To bankers and financial officers it is the sophisticated use of such techniques as currency hedging and interest rate swaps. To insurance buyers and sellers it is coordination of insurable risks and the reduction of insurance costs. To hospital administrators it may mean 'quality assurance.' To safety professionals it is reducing accidents and injuries [Kloman 90, p. 20].

Kloman Paraphrase of Rowe

Risk management is a discipline for living with the possibility that future events may cause adverse effects [Kloman 90, p. 203].

SEI Definition

Risk management sets forth a discipline and environment of proactive decisions and actions to

1. assess continuously what can go wrong (risks).
2. determine what risks are important to deal with.
3. implement strategies to deal with those risk.

Note: The SEI definition emphasizes the continuous aspect of risk management.

Example

When using true risk management, risks are assessed continuously and used for decision making in all phases of a project. Risks are carried forward and dealt with until they are resolved, or until they turn into problems and are handled as such.

Non-Example

In some programs, risks are assessed only once during initial project planning. Major risks are identified and mitigated, but risks are never explicitly reviewed again.

This is not an example of risk management because risks would not be continuously assessed and new risks continuously identified.

Principles of Risk Management

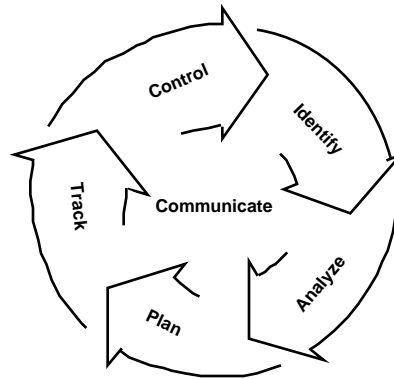
These five principles provide a framework to accomplish effective risk management.

Principle	Effective risk management requires
Global perspective	<ul style="list-style-type: none"> • Viewing software development within the context of the larger systems-level definition, design, and development. • Recognizing both the potential value of opportunity and the potential impact of adverse effects.
Forward-looking view	<ul style="list-style-type: none"> • Thinking toward tomorrow, identifying uncertainties, anticipating potential outcomes. • Managing project resources and activities while anticipating uncertainties.
Open communication	<ul style="list-style-type: none"> • Encouraging free-flowing information at and between all project levels. • Enabling formal, informal, and impromptu communication. • Using processes that value the individual voice (bringing unique knowledge and insight to identifying and managing risk).
Integrated management	<ul style="list-style-type: none"> • Making risk management an integral and vital part of project management. • Adapting risk management methods and tools to a project's infrastructure and culture.
Continuous process	<ul style="list-style-type: none"> • Sustaining constant vigilance. • Identifying and managing risks routinely throughout all phases of the project's life cycle.

SEI Risk Management Paradigm

Risk Management Paradigm

The SEI Risk Management Paradigm is depicted below [Van Scoy 92, p. 9]. The paradigm illustrates a set of functions that are identified as continuous activities throughout the life cycle of a project.



Functions of Risk Management

The functions of risk management are described below [SEI 92, Higuera 93]. Each risk nominally goes through these functions sequentially but the activity occurs continuously, concurrently, and iteratively throughout the project life cycle (e.g., planning for one risk may identify another).

Function	Description
Identify	Search for and locate risks before they become problems.
Analyze	Process risk data into decision-making information. Determine the values of impact, likelihood, and time-frame.
Plan	Translate risk information into decisions and actions (both present and future) and implement those actions.
Track	Monitor risk indicators and mitigation actions.
Control	Correct for deviations from the planned risk actions.
Communicate	Provide information and feedback internal and external to the project on the risk activities, current risks, and emerging risks. <u>Note:</u> Communication happens throughout all the functions of risk management.

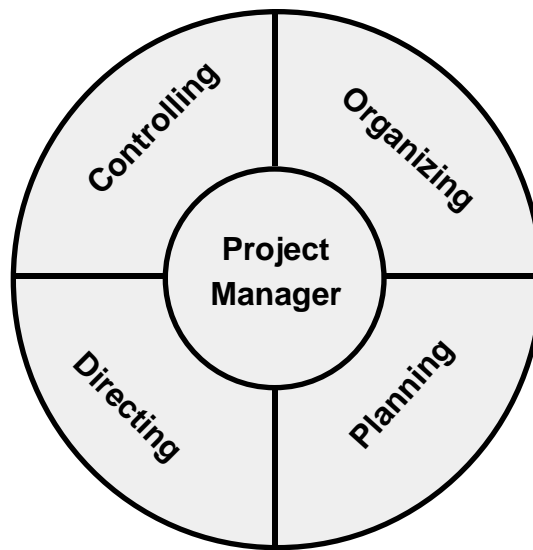
How Risk Management Fits with Project Management

Introduction

Risk management integrates readily with the functions of project management, and adds new power and scope to those functions.

Project Management

Project management may be thought of as a set of people-oriented, integrated activities as shown below [Kezbom 89, p. 3-6].



Project Management

Project Management Functions

The functions of project management are described below [Kezbom 89, p. 4].

Function	Description
Planning	Define desired results, strategy, course of action, and checkpoints.
Organizing	Establish structure, roles and responsibilities, and allocate resources.
Directing	Communicate, delegate, and coordinate activities.
Controlling	Provide measurement, feedback, evaluation, and adjustment.

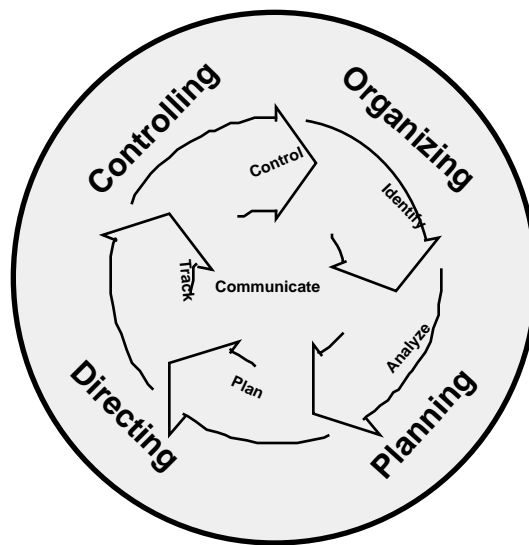
What Risk Management Adds to Project Management

Risk management looks ahead in the project and adds a structured approach for the identification and analysis of risks to begin planning. Risk planning adds the proactive perspective of alternatives and contingencies to mitigate risk, whereas the “Track” and “Control” functions of the risk management paradigm merges with the controlling function in project management.

In addition, the five principles of risk management (global perspective, forward-looking view, open communication, integrated management, continuous process) strengthen the proactive and systematic nature of effective project management.

Integrated Project Management Concept

The combination of these two concepts is shown in the diagram below.

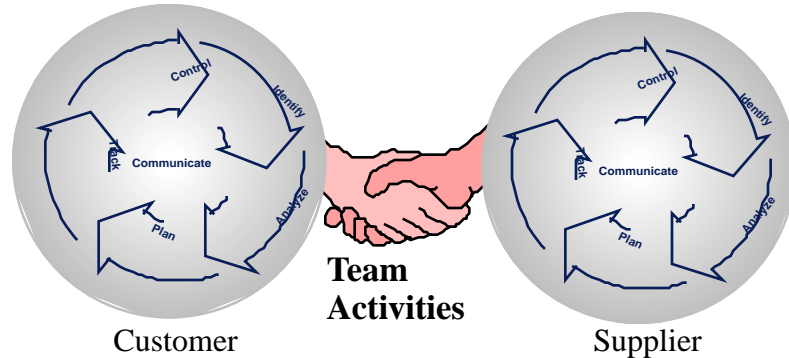


Integrated Project Management

Team Risk Management Principles

Team Activities

Team Risk Management extends risk management with team-oriented activities involving the customer and supplier (e.g., government and contractor) where customer and supplier apply methods together.



Principles of Team Risk Management

The first two principles below added to the five principles of risk management constitute the principles of Team Risk Management. Open communications are further enhanced when customer and supplier use consensus-based processes that also value the individual voice.

Principle	Effective Team Risk Management requires:
Shared product vision	<ul style="list-style-type: none"> • Sharing a product vision based upon common purpose, shared ownership, and collective commitment. • Focusing on results.
Teamwork	<ul style="list-style-type: none"> • Working cooperatively to achieve a common goal. • Pooling talent, skills, and knowledge.
Global perspective	<ul style="list-style-type: none"> • Viewing within the systems context.
Forward-looking view	<ul style="list-style-type: none"> • Anticipating uncertainties.
Open communication	<ul style="list-style-type: none"> • Enabling communication. • Using consensus-based processes between customer and supplier that value the individual voice.
Integrated management	<ul style="list-style-type: none"> • Making risk management integral.
Continuous process	<ul style="list-style-type: none"> • Managing risks routinely.

Team Risk Management Functions

Introduction

Team Risk Management establishes an environment built on a set of processes, methods, and tools that enable the customer and supplier to work together cooperatively, continuously managing risks throughout the life cycle of a software-dependent development program. It is built on a foundation of the principles of risk management and the philosophy of cooperative teams.

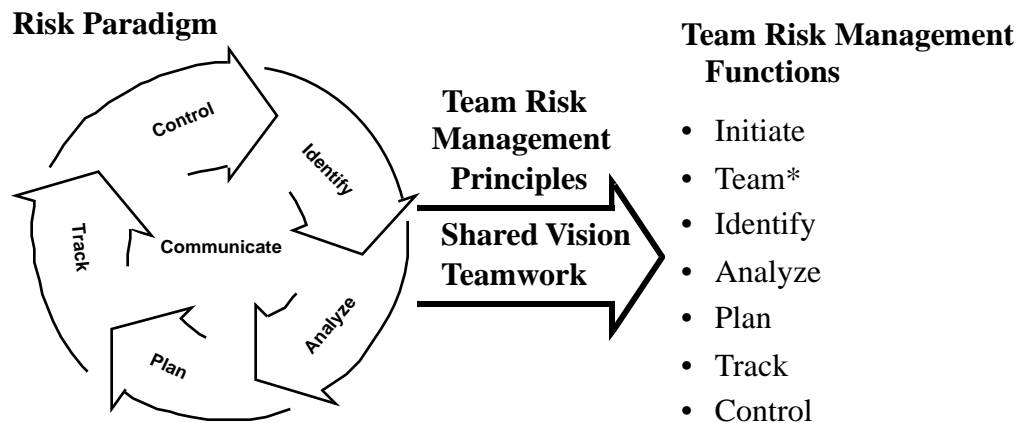
Team Risk Management Defined

Team Risk Management is a paradigm for managing programs or projects by developing a shared product vision, focused on results, and using the principles and tools of risk management to cooperatively manage risks and opportunities.

Adding Team To Risk Management

Team Risk Management implements the functions of risk management that are illustrated in the SEI Risk Paradigm by adding the principles of shared product vision and teamwork to make up the functions of Team Risk Management.

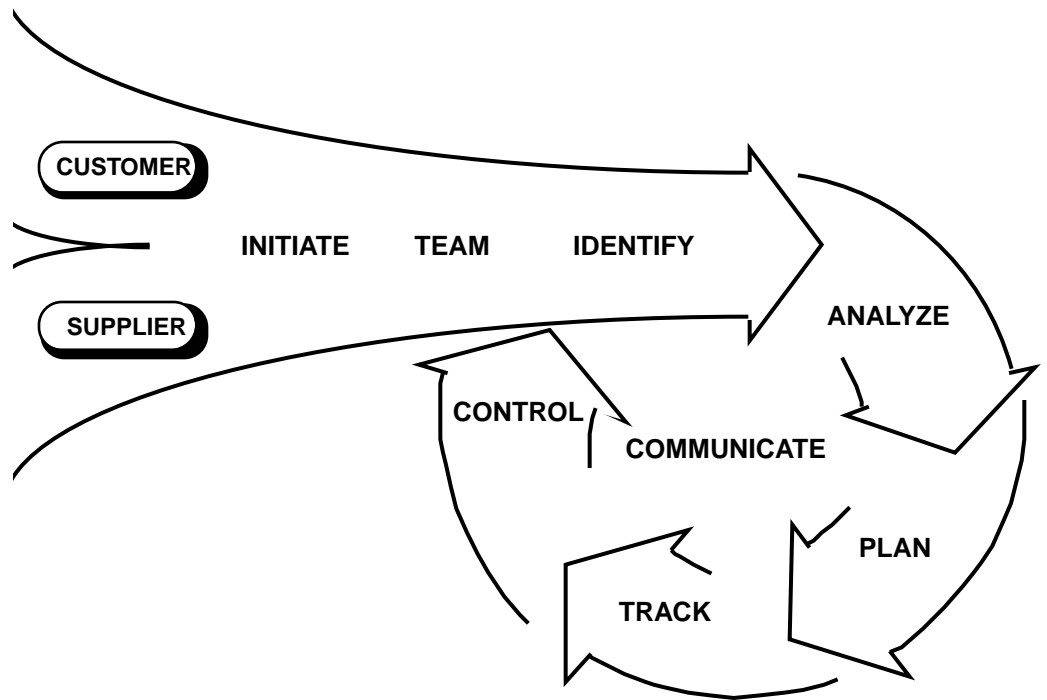
Team Risk Management adds two new functions, **Initiate** and **Team**, to recognize both the required cultural paradigm shift and the emphasis on teamwork.



*Note: Team is used as an action verb.

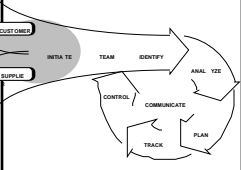
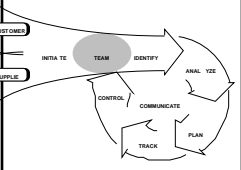
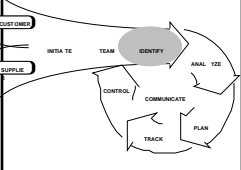
Team Risk Management Model

The Team Risk Management model is shown below. Each function has a set of activities that are backed by processes, methods, and tools that encourage and enhance communication and teamwork. Two additional functions, **Initiate** and **Team**, described below complete the model.

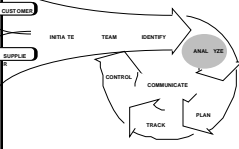
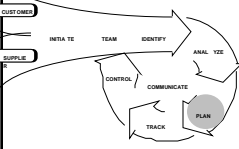
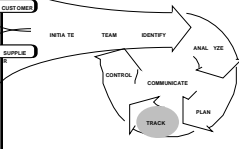


Team Risk Management Functions

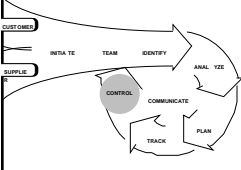
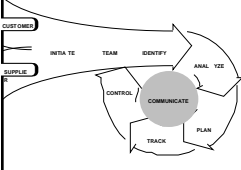
The table below describes how Team Risk Management implements the risk management functions. Communication is an integral part of all these activities. However, explicit formal activities provide excellent communication opportunities for both customer and supplier.

Function	Description
	<p>Recognize the need and commit to create the team culture. Either customer or supplier may initiate team activity, but both must commit to sustain the teams.</p>
	<p>Formalize the customer and supplier team and merge the viewpoints to form a shared product vision. Systematic methods periodically and jointly applied establish a shared understanding of the project risks and their relative importance. Establish joint information base of risks, priorities, metrics, and action plans.</p> <p>Example methods:</p> <ul style="list-style-type: none"> • team building
	<p>Search for and locate risks before they become problems. Identify risks and set project priorities to arrive at a joint understanding of what is important.</p> <p>Identify new risks and changes.</p> <p>Example methods:</p> <ul style="list-style-type: none"> • reviewing lists of existing risks and known or anticipated changes • structured interviews applied to teams periodically, such as at major milestones

Team Risk Management Functions, continued

Function	Description
 <p>The diagram shows a circular flow of risk management functions: ANALYZE, PLAN, TRACK, COMMUNICATE, and CONTROL. It also includes external inputs from CUSTOMER, SUPPLIER, and INTERNAL TEAM. In this row, the 'ANALYZE' step is highlighted with a grey circle.</p>	<p>Process risk data into decision-making information. Risk analysis is performed to determine what is important to the project, to set priorities, and to allocate resources.</p> <p>Group risks and quantify impact, likelihood, and time frame.</p> <p>Example methods:</p> <ul style="list-style-type: none"> • affinity grouping to classify • voting to set priorities • pairwise comparison to set priorities
 <p>The diagram shows a circular flow of risk management functions: ANALYZE, PLAN, TRACK, COMMUNICATE, and CONTROL. It also includes external inputs from CUSTOMER, SUPPLIER, and INTERNAL TEAM. In this row, the 'PLAN' step is highlighted with a grey circle.</p>	<p>Translate risk information into decisions and mitigating actions (both present and future) and implement those actions. Joint risks require a team process to develop mitigation plans.</p> <p>Establish the mitigation plans for the risks.</p> <p>Example methods:</p> <ul style="list-style-type: none"> • cause and effect diagrams • brainstorming • cost estimating • pert charting <p><u>Note:</u> A joint risk is one that requires action or attention by both customer and supplier.</p>
 <p>The diagram shows a circular flow of risk management functions: ANALYZE, PLAN, TRACK, COMMUNICATE, and CONTROL. It also includes external inputs from CUSTOMER, SUPPLIER, and INTERNAL TEAM. In this row, the 'TRACK' step is highlighted with a grey circle.</p>	<p>Monitor risk indicators and mitigation plans. Indicators and trends provide information to activate plans and contingencies. These are also reviewed periodically to measure progress and identify new risks.</p> <p>Maintain visibility of risks, project priority, and mitigation plans.</p> <p>Example methods:</p> <ul style="list-style-type: none"> • risk-driven technical performance measures • performance trend charts

Team Risk Management Functions, continued

Function	Description
	<p>Correct for deviations from the risk mitigation plans. Actions can lead to corrections in products or processes. Any action may lead to joint resolution. Changes to risks, risks that become problems, or faulty plans require adjustments in plans or actions.</p> <p>Maintain the level of risk that is acceptable to the program managers.</p> <p>Example methods:</p> <ul style="list-style-type: none"> • action plans • decision trees and tables
	<p>Provide information and feedback internal and external to the project on the risk activities, current risks, and emerging risks. Communication occurs formally as well as informally.</p> <p>Establish continuous, open communication. Formal communication about risks and action plans is integrated into existing technical interchange meetings, design reviews, and user requirements meetings.</p> <p>Example formal processes:</p> <ul style="list-style-type: none"> • <i>Team Review</i>: Quarterly review meetings to evaluate status, new risks, priorities, and action plans. • <i>Joint Action Planning</i>: Joint activity to develop mitigation plans for joint risks. <p><u>Note</u>: Example methods are the same as those listed in Analyze and Plan.</p>

Scenario Comparing Team Risk Management to Risk Management

Introduction Team Risk Management builds on the principles and functions of risk management by adding teamwork.

Comparison Scenario To show the differences between Team Risk Management and risk management, a scenario of how a risk would be handled in each is compared. The table below lists each Team Risk Management function and describes a typical activity in risk management compared to a typical activity in Team Risk Management.

Function	In Risk Management	In Team Risk Management
Initiate	There is no comparable activity (the first activity is to identify risks).	Customer requests the supplier to execute risk management as a team. Customer separately identifies the project risks. Supplier separately identifies the project risks.
Team	There is no comparable activity (the first activity is to identify risks).	Customer and supplier do team building. Customer and supplier formally constitute a management team to conduct <i>Team Reviews</i> .
Identify	Supplier identifies risk of inadequate time in the test lab prior to system delivery.	Supplier identifies risk of inadequate time in the test lab prior to system delivery.
Analyze	Supplier identifies this risk as first priority.	Supplier reviews risk with customer at <i>Team Review</i> . Customer and supplier jointly determine the risk to be 5th in a set of 20 top program risks.

Comparison Scenario,
continued

Function	In Risk Management	In Team Risk Management
Plan	Supplier plans to reorder test schedule to ensure critical elements are tested first in case risk proves true.	Customer and supplier jointly plan to have: <ul style="list-style-type: none"> • supplier reorder tests • customer locate & secure contingency test lab
Track	Test schedule is reordered.	Each test event and planned action is monitored jointly for follow-up.
Control	Risk proves true. Supplier asks for delay in delivery time to complete testing.	Risk proves true. Supplier makes use of contingency lab for the rest of testing.
Communicate	Internal communications are open. Issues are shared with the customer on a case-by-case basis. The test schedule does not come up until the supplier asks for a delay.	Internal communications are open. Communications between customer and supplier are open. Customer and supplier know ahead of the decision the risk and alternative actions to take.
Results	System delivery is delayed to allow for complete testing.	System is delivered on time, completely tested. Customer and supplier now know each other's point of view and both share a common set of priorities.

Advantages of Team Risk Management

Introduction

Team Risk Management offers a number of advantages for a project, as compared to individual or group risk management. However, it also involves a change from past management practices and past customer-supplier (government-contractor) relationships, and this will require new commitments by both. These new commitments, in turn, may involve investment – particularly early in the program.

Advantages and Commitments

The following table highlights the advantages of Team Risk Management and also identifies what commitment would be required by the team (customer and supplier) to achieve the advantage.

Advantage	Description	Required Commitment
Improved communications	<p>The aspect of routine communications includes both customer and supplier. Risks are treated by all as depersonalized issues that threaten the common goal of a successful program.</p> <p>By openly sharing risks, both the customer and supplier are able to draw on each other's resources in mitigating risks and enabling rapid response to developing risks or problems.</p>	<p>Move beyond finger pointing and resolve project risks as a joint responsibility.</p> <p>Encourage all forms of communications (e.g., telephone and electronic mail) among all team members.</p> <p>Encourage all to explore what could cause the program to go off track.</p> <p>Allow for more meetings and more travel initially.</p>
Multiple perspectives on risks	<p>Team members are not limited to looking for mitigation strategies among their own limited areas of control.</p> <p>Bringing both customer and supplier together in mitigating risks opens doors to strategies that both can do together, but that neither could do alone.</p>	<p>Accept the philosophy that the team can arrive at better solutions than any individual—even the program manager—can alone.</p>

Advantages and Commitments,
continued

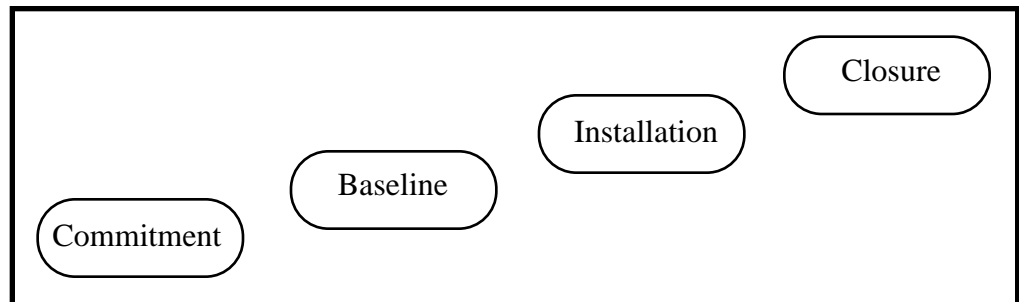
Advantage	Description	Required Commitment
Broader base of expertise	<p>The combination of customer and supplier brings together a richer pool of experience in perceiving and dealing with risks</p> <p>The customer often brings better perspectives on the application domain and “what’s possible to change.”</p> <p>The supplier often brings better perspectives on the technical domain and “what’s possible to do.”</p>	Accept all the unique perspectives that others bring to the table.
Broad-based buy-in	<p>Risks and mitigation strategies are cooperatively determined by the team (customer and supplier), so all accept the results of the process. “Second guessing” and criticism after the fact are eliminated.</p> <p>Over time trust develops and expectations are realized. This paves the way for strengthened relationships and the power of teamwork.</p>	<p>Encourage and allow teams to meet, discuss, and agree.</p> <p>Invest in improving meeting skills.</p> <p>Use outside facilitation as required.</p>
Risk consolidation	Structured methods bring together risks identified in each organization, giving decision makers a more global perspective and highlighting areas of common interest and concern.	<p>Accept that risk is inherent in enterprise.</p> <p>Abandon the notion that risks should not be discussed until a mitigation strategy has been identified.</p>

Answers to Frequently Asked Questions

How to Start?

How can I start Team Risk Management in my organization?

Typically, the SEI approach to installing Team Risk Management is a four-step process, as is illustrated in the figure below.



1. Establish awareness and commitment
2. Establish a baseline of existing practices and existing risks.
3. Install and adapt the Team Risk Management methods to existing project management.
4. Mutually come to closure with a defined and established risk management process with formal training.

How Long?

How long will it take to install Team Risk Management in my organization?

We believe that once the commitment is made and the change accepted, 18 to 24 months should provide the necessary time to install, adapt, and train the Team Risk Management methods.

Note: The acceptance of change is key to effectively installing Team Risk Management.

When to Start?

When should I start?

The earlier the better. The quicker you begin to manage risks,

- the greater opportunity you have to mitigate risks
- the better are your alternatives
- the greater are your chances of avoiding cost and schedule impacts

The greatest leverage is at the front end of the life cycle by making risks and risk management a visible part of the project from the beginning as a recognized part of acquisition and development.

More Information?

How can I get more information?

Contact SEI Customer Relations:

Customer Relations

Software Engineering Institute

Carnegie Mellon University

Pittsburgh, PA 15213-3890

Internet: customer-relations@sei.cmu.edu

Phone: (412) 268-5800

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This report will familiarize you with the concept of Team Risk Management by providing a description of the overall process that engages both the customer and supplier in a cooperative framework using explicit methods to manage project risks.