Lesson Objectives

This lesson provides an overview of the Risk Management Process for an acquisition program. Objectives covered in this lesson are:

- Define the 5 key activities of the Risk Management Process
- Recognize the Program Manager's options for handling risks
- Define the objective of a cost risk analysis

Management Process

Risk Management is an integral part of program management responsibility. It requires all team members to use a disciplined approach so that risk is reduced to an acceptable level. This is done by assessing and handling the risks associated with the design, manufacturing, technology, test, and support functions that are part of systems acquisition.

A good risk management program can enhance program management effectiveness and provide managers with an important tool for reducing a system's life cycle costs.

The following five key activities make up the Risk Management Process Model:

- Risk Identification
- Risk Analysis
- Risk Mitigation Planning
- Risk Mitigation Plan Implementation
- Risk Tracking

Characteristics

Emphasis on risk management coincides with overall DoD efforts to reduce Life Cycle Costs (LCC) of system acquisitions. Risk management is designed to enhance program management effectiveness and provide Program Managers (PMs) with a key tool to reduce LCC, increase program likelihood of success, and assess areas of cost uncertainty.

Characteristics of a successful acquisition program are:

- Feasible and well understood user requirements
- Close partnership with all stakeholders
- A planned risk management process that is integral to the Systems Engineering Plans (SEP) and Test and Evaluation Master Plans (TEMP) processes
- Continuous technical reviews
- Identified risks and completed risk analyses
- Developed mitigation plans
- An established success criteria
- Periodic risk assessment
- An independent risk analysis from the Program Manager
- A formally documented risk management process

Guidelines

Chapter 2 of The Risk Management Guide for DoD Acquisition outlines the top-level guidelines for effective risk management. The top guidelines are:

- Assess the root causes of program risks and develop strategies for each acquisition phase to manage these risks.
- Include industry participation in risk management.
- Use a proactive, structured risk assessment and analysis activity to identify and analyze root causes.
- Establish a series of "risk assessment events" where the effectiveness of risk reduction conducted to date is reviewed.
- Include processes as part of risk assessment.
- Review the contractor's baseline plans as part of the IBR process which includes joint government/contractor evaluation.
- Review the contractor's Schedule Risk Assessment (SRA) when provided as part of the IMS data item (DI-MGMT-81650).
- Establish a realistic schedule and funding baseline as early as possible.
- Define a clear set of evaluation criteria for assigning risk ratings (low, moderate, high) for identified root causes.
- Determine the program's approach to risk prioritization.

Components of Risk

Risk is a measurement of future uncertainties in achieving performance goals and objectives within defined cost, schedule and performance constraints. There are three components that classify the risk. They are Future Root Cause, Probability, and Consequence.

Select each component below to view its definition.

- Future Root Cause
- Probability
- Consequence

A future root cause is the most basic reason for the presence of a risk. Accordingly, risk should be tied to future root causes and their effects.

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Future Root Cause

A future root cause which, if eliminated or corrected, would prevent a potential consequence from occurring.

Probability

A probability assessed at the present time of that future root cause occurring.

Consequence

The consequence of that future occurrence.

Risk Assessment

Risk Assessment is the umbrella term that includes the first two key activities of the Risk Management Process Model.

Risk Identification:

Examines each element of the program to identify associated root causes, begin their documentation, and set the stage for their successful management. Risk can be associated will all aspects of a program.

Click here to view a program risk assessment checklist.

Risk Analysis:

The intent of risk analysis is to answer the question "How big is the risk?" It considers the likelihood (probability) of the root cause occurrence; identifies the possible consequences in terms of performance, schedule, and cost; and identifies the risk level using the Risk Reporting Matrix.

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Long Description

Two keys on a key ring illustrating the two key components of Risk Assessment: Risk Identification and Risk Analysis.

Risk Identification

The intent of risk identification is to answer the question "What can go wrong?" Once you have identified what can go wrong, the next step is to evaluate the impact of the events if they do occur.

Risk identification begins as early as possible in successful programs and continues throughout the program with regular reviews and analyses of Technical Performance Measurements (TPMs), schedule, Earned Value Management (EVM) data/trends, and other program information available to program team members.

Click here for a typical list of risk sources.

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Risk Sources

Threat:

The sensitivity of the program to uncertainty in the threat description, the degree to which the system design would have to change if the threat's parameters change, or the vulnerability of the program to foreign intelligence collection efforts (sensitivity to threat countermeasure).

Requirements:

The sensitivity of the program to uncertainty in the system description and requirements, excluding those caused by threat uncertainty. Requirements include operational needs, attributes, performance and readiness parameters (including KPPs), constraints, technology, design processes, and WBS elements.

Technical Baseline:

The ability of the system configuration to achieve the program's engineering objectives based on the available technology, design tools, design maturity, etc. Program uncertainties and the processes associated with the “ilities” (reliability, supportability, maintainability, etc.) must be considered. The system configuration is an agreed-to description (an approved and released document or a set of documents) of the attributes of a product, at a point in time, which serves as a basis for defining change.

Test and Evaluation:

The adequacy and capability of the test and evaluation program to assess attainment of significant performance specifications and determine whether the system is operationally effective, operationally suitable, and interoperable.

Modeling and Simulation (M&S):

The adequacy and capability of M&S to support all life-cycle phases of a program using verified, validated, and accredited models and simulations.

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Technology:

The degree to which the technology proposed for the program has demonstrated sufficient maturity to be realistically capable of meeting all of the program's objectives.

Logistics:

The ability of the system configuration and associated documentation to achieve the program's logistics objectives based on the system design, maintenance concept, support system design, and availability of support data and resources.

Production / Facilities:

The ability of the system configuration to achieve the program's production objectives based on the system design, manufacturing processes chosen, and availability of manufacturing resources (repair resources in the sustainment phase).

Concurrency:

The sensitivity of the program to uncertainty resulting from the combining or overlapping of life-cycle phases or activities.

Industrial Capabilities:

The abilities, experience, resources, and knowledge of the contractors to design, develop, manufacture, and support the system.

Cost:

The ability of the system to achieve the program's life-cycle support objectives. This includes the effects of budget and affordability decisions and the effects of inherent errors in the cost estimating technique(s) used (given that the technical requirements were properly defined and taking into account known and unknown program information).

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Management:

The degree to which program plans and strategies exist and are realistic and consistent. The government's acquisition and support team should
be qualified and sufficiently staffed to manage the program.

Schedule:

The sufficiency of the time allocated for performing the defined acquisition tasks. This factor includes the effects of programmatic schedule decisions, the inherent errors in schedule estimating, and external physical constraints.

External Factors:

The availability of government resources external to the program office that are required to support the program such as facilities, resources, personnel, government furnished equipment, etc.

Budget:

The sensitivity of the program to budget variations and reductions and the resultant program turbulence.

Earned Value Management System:

The adequacy of the contractor's EVM process and the realism of the integrated baseline for managing the program.

Risk Analysis

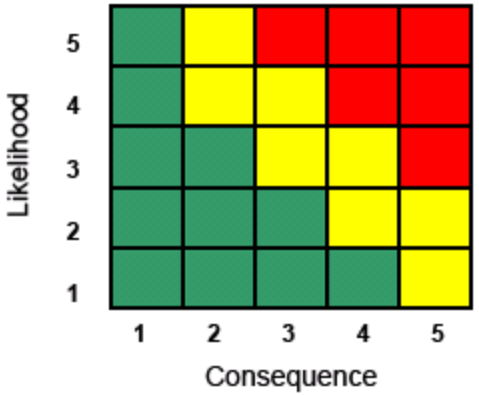
The intent of risk analysis is to answer the question "How big is the risk?" by considering the likehood of the root cause occurence, identifying the possible consequences, and identifying the risk level.

The Risk Reporting Matrix is typically included to determine the levels of risk identified within a program. The risk rating of high (red), moderate (yellow), or low (green) is determined from a matrix box where probability is represented by the "y" (vertical) axis and consequence is represented by the "x" (horizontal) axis.

The graphics on the next page give an example of a Risk Reporting Matrix with relative x and y coordinates and an illustration of how to report Consequence Criteria.

Risk Analysis: Reporting Examples

Reporting Examples



The **Risk Reporting Matrix**, to the left, is typically used to determine the level of risks identified within a program. The level of risk for each root cause is reported as low (green), moderate (yellow), or high (red).

The **Likelihood/Consequence Chart**, to the right, is a single consequence scale. Let's say for instance that a program has a root cause measured at Level 3. At this level, the probability of it occurring is 50%. Although it is easily applied, single scales are not appropriate for all programs. A more complex scale can narrow the focus on specific areas of consequence.

Likelihood

Level	Likelihood	Probability of Occurrence
1	Not Likely	~10%
2	Low Likelihood	~30%
3	Likely	~50%
4	Highly Likely	~70%
5	Near Certainty	~90%

Risk Analysis: Types of Consequences

Types of Consequences

There are five levels of consequence that affect **Technical Performance**, **Schedule**, and **Cost**.

The level and types of consequences of each risk are established utilizing criteria such as those described in the chart to the right. Continuing with the example of a program with 50% probability (Level 3), the risk is only a minor schedule slippage.

Such a slippage is classified as a schedule risk since its root cause is schedule related.

Level	Technical Performance	Schedule	Cost
1	Minimal or no consequence to technical performance	Minimal or no impact	Minimal or no impact
2	Minor reduction in technical performance or supportability, can be tolerated with little or no impact on program	Able to meet key dates. Slip < * month(s)	Budget increase or unit production cost increases. < ** (1% of Budget)
3	Moderate reduction in technical performance or supportability with limited impact on program objectives	Minor schedule slip. Able to meet key milestones with no schedule float. Slip < * month(s) Sub-system slip > * month(s) plus available float.	Budget increase or unit production cost increase < ** (5% of Budget)
4	Significant degradation in technical performance or major shortfall in supportability; may jeopardize program success	Program critical path affected. Slip < * months	Budget increase or unit production cost increase < ** (5% of Budget)
5	Severe degradation in technical performance; Cannot meet KPP or key technical/ supportability threshold; will jeopardize program success	Cannot meet key program milestones. Slip < * months	Exceeds APB threshold > ** (10% of Budget)

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Long Description

Types of Consequence

Matrix describes consequence levels and characteristics.

Consequence Level - 1 Technical Performance - Minimal or no consequence to technical performance

Schedule - Minimal or no impact Cost - **Minimal or no Impact**

Consequence Level - 2 Technical Performance - Minor reduction in technical performance or supportability, can be tolerated with little or no impact on program

Schedule - Able to meet key dates **Slip < # month(s)**

Cost - Budget increase or unit production cost increases **< $ (1% of budget)**

Consequence Level - 3 Technical performance - Moderate reduction in technical performance or supportability with limited impact on program

Schedule - Minor schedule slip; able to meet key milestones with no schedule float

Slip < # month(s)
Sub-system slip > # month(s) plus available float

Cost - Budget increase or unit production cost increase **< $ (5% of budget)**

Long Description

Consequence Level - 4 Technical Performance - Significant degradation in technical performance or major shortfall in supportability; may jeopardize program success

Schedule - Program critical path affected **Slip < # months**

Cost - Budget increase or unit production cost increase **< $ (5% of budget)**

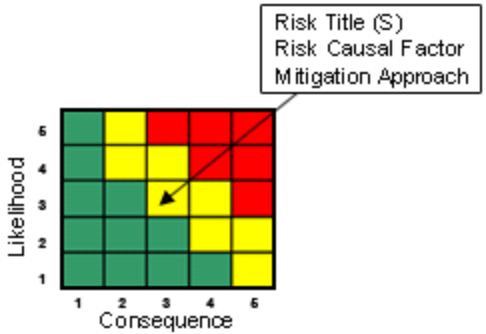
Consequence Level - 5 Technical Performance - Severe degradation in technical performance; cannot meet KPP or key technical/supportability threshold; will jeopardize program success

Schedule - Cannot meet key program milestones **Slip < # months**

Cost - Exceeds APB threshold **> $ (10% of Budget)**

Risk Analysis: Task Results

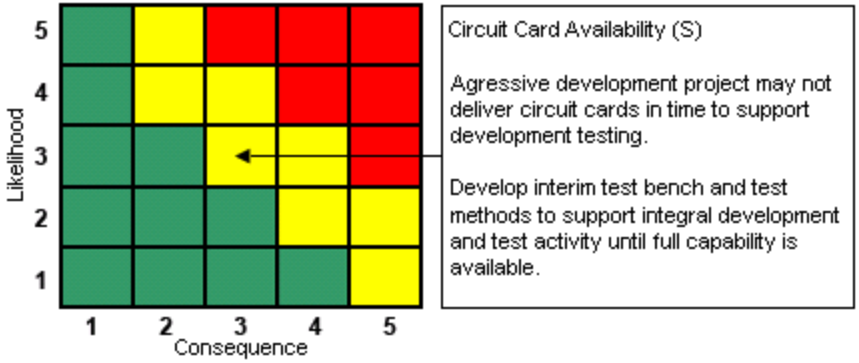
Task Results



The results for each risk are then plotted in the corresponding single square on the Risk Reporting Matrix.

In this example, since the level of likelihood and consequence were both "3", the corresponding schedule risk is reported as "yellow". The display method includes the risk title, risk causal factor, and mitigation approach.

The second chart below gives an example of how an actual report would appear in a document.



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Risk Title

(S) - Schedule Risk
(P) - Performance Risk
(C) - Cost Risk

Risk Causal Factor

Described what may not happen on schedule and what part of the program the even would impact.

Mitigation Approach

Enables program success. The plan specifies what should be done, when it should be done, who is responsible, and the funding required to implement the risk mitigation plan.

Risk Mitigation Planning

The intent of Risk Mitigation Planning is to answer the question, "What is the program approach for addressing this potential unfavorable consequence?" Risk Mitigation Planning addresses specifics of what should be done, when it should be accomplished, who is responsible, and the funding required to implement the risk mitigation plan. Program Managers have several options that could best handle and set risk at acceptable levels.

Select each option below to view its description.

- Controlling
- Avoiding
- Assuming
- Transferring

Popup Text

Controlling

Controlling risk means lowering the chance that the event will occur by following some of the risk control actions below:

- Using multiple contractors
- Conducting multiple tests
- Reusing proven software versus developing new software
- Parallel design and development of key sub-systems and components
- Incremental Development (Pre-planned product improvement (P3I))

Avoiding

Avoiding risk means changing the source (element or constraint) that is subjecting the program to risk. Risk may be avoided by implementing some of the following avoidance techniques:

- Reducing the scope of performance objectives
- Using more expensive materials or processes with proven track records
- Extending the schedule to increase the probability of success

Assuming

all unknown or unidentified risks is assumed. Assuming risks means planning for the potential consequences by using some of the following techniques:

- Accepting the risk
- Putting a monitoring process in place
- Taking action now (e.g., reserving funds, modifying schedules, etc.) that will support contingency actions if the risk materializes into an actual problem.

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Transferring

Having someone else takes accountability for the risk. Ways that risk can be transferred included:

- Using form-fixed price contracts and warranties to transfer cost risk to the contractor
- Assigning responsibility to the organization that is best suited to minimized the probability of a negative consequence

Implementation

Implementation is the execution of the mitigation plan and answers the question, "How can the planned risk mitigation be implemented?"

It **determines:**

- Planning, budget, requirements and needed contractual changes

It **provides:**

- A coordination vehicle with management and other stakeholders

It **directs:**

- The teams to execute the defined and approved risk mitigation plan

It **outlines:**

- The risk reporting requirements for on-going monitoring

It **documents:**

- Change history

Risk Tracking

The success of the Risk Management Process Model is due to its checks and balances. Just as Implementation supports successful Risk Mitigation; Risk Tracking supports successful risk mitigation.

Risk tracking systematically tracks and evaluates the performance of risk mitigation actions against established metrics throughout the acquisition process. It feeds information back into the other risk activities of identification, analysis, mitigation planning, and mitigation plan implementation.

Risk tracking documents may include:

Program metrics, technical reports, earned value reports, watch lists, schedule performance reports, technical review minutes/reports, and critical risk processes reports.

This feedback gives a program office the information it needs to accurately re-evaluate known risks on a periodic basis and examine the program for new root causes.

Knowledge Review

Choose the correct order of key activities that make up the Risk Management Process Model.

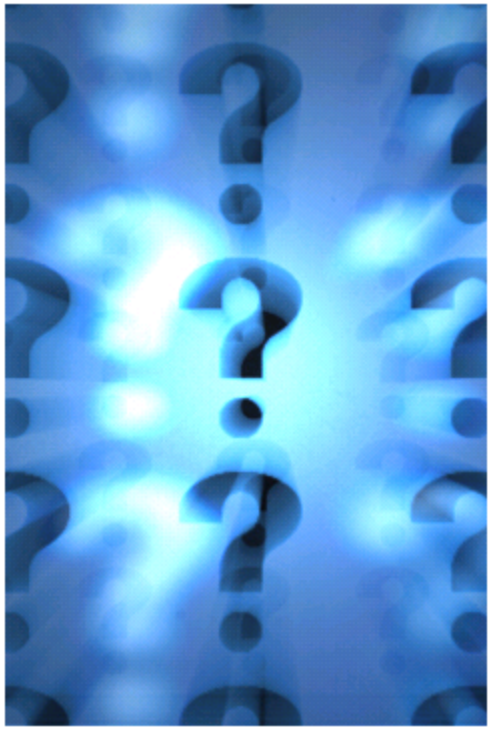
- [ ] Key 1: Risk Tracking, Key 2: Risk Mitigation Planning, Key 3: Risk Identification, Key 4: Risk Analysis, Key 5: Risk Mitigation Plan Implementation
- [ ] Key 1: Risk Analysis, Key 2: Risk Mitigation Planning, Key 3: Risk Identification, Key 4: Risk Mitigation Plan Implementation, Key 5: Risk Tracking
- [x] Key 1: Risk Identification, Key 2: Risk Analysis, Key 3: Risk Mitigation Planning, Key 4: Risk Mitigation Plan Implementation, Key 5: Risk Tracking

Check Answer

The correct order of key activities that make up the Risk Management Process Model is: **Key 1: Risk Identification, Key 2: Risk Analysis, Key 3: Risk Mitigation Planning, Key 4: Risk Mitigation Plan Implementation, Key 5: Risk Tracking**.

Knowledge Review

The three categories of consequences are schedule, cost, and _____.



- [ ] Technology
- [ ] Budget
- [ ] Labor
- [x] Performance

Check Answer

The three categories of consequences are schedule, cost, and **performance**.

Summary

There are five key activities in the Risk Management Process: *Risk Identification*, *Risk Analysis*, *Risk Mitigation Planning*, *Risk Mitigation Plan Implementation*, and *Risk Tracking*.

Risk Assessment includes:

- Risk Identification and Risk Analysis

There are four strategies that Program Managers can use to handle risk: *Controlling*, *Avoiding*, *Assuming*, and *Transferring*.

Risk Reporting Documents include:

- Risk Reporting Matrix (used to determine the level of risk within a program); a Likelihood Chart (displays percent probability and their levels); and a Consequence Chart displays the affects of Technical Performance, Schedule, Cost)

Risk Planning:

- Answers the questions "who, what, where, when, and how"
- Describes and schedules the tasks for risk identification, risk analysis, risk mitigation planning, resourcing, risk mitigation plan implementation, and risk tracking throughout a program's life cycle

Lesson Completion

You have completed the content for this lesson.

To continue, select another lesson from the Table of Contents on the left.

If you have closed or hidden the Table of Contents, click the Show TOC button at the top in the Atlas navigation bar.