Continuous Risk Management at NASA

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Overview

Background
  Why do Risk Management
  NASA’s Approach
NASA’s Continuous Risk Management Course
  Introduction
  Risk Management Functions
  Course Evaluations
Conclusions
Background
NASA Risk Management Guidance

  - RM is one of 7 major themes;
  - Section 4.2 establishes RM requirements;
  - Stresses RM as an integral part of program/project management.
- NPD 2820, “Software Policy”
- SMA independent assessments of programs and projects are RM-based.
Program Managers must:

- Develop and implement a Risk Management Plan;
- Implement a continuous RM process;
- Know their primary risks* and seek governing program management council (GPM C) approval of decisions to “accept” them.

*Primary risks--those undesirable events having both high probability and high impact/severity
RM--Why now?

The current and future environment of:
- Tighter budgets;
- Fewer people;
- Shorter schedules;
- More complex systems;
- ”Better, Faster, Cheaper” spacecraft projects;
- Limited facility dollars;
- Performance based contracting;
- Full-cost accounting.….

With all of this we need informed decision-making to achieve first time success!
Continuous Risk Management (CRM) Course

Taught by Software Assurance Technology Center, Goddard Space Flight Center
Course #NASA-FSFC-SATC-98-001

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NASA Risk Management Course

Objectives

⇒ Understand the concepts and principles of Continuous Risk Management and how to apply them

⇒ Develop basic risk management skills for each function of Continuous Risk Management

⇒ Be able to use key methods and tools

⇒ Be able to tailor Continuous Risk Management to a project or organization
Project Management Plan

Overview

Schedule

Budget

Risk Management Plan

Configuration Management Plan

...
Continuous Risk Management Course

Identify

Analyze

Plan

Track

Control

Communicate

Document
CRM Course Outline

1 Introduction

2 Continuous Risk Management Paradigm
   2-1 Overview
   2-2 Identify
   2-3 Analyze
   2-4 Plan
   2-5 Track
   2-6 Control
   2-7 Communicate and Document

3 Risk Management Example Implementation

4 Getting Started in Continuous Risk Management

5 Risk Management Workshop
CRM Workshop Outline

Objectives:
1 - Partial completion of risk management plan
2 - Initial risk identification and mitigation

Steps:

<table>
<thead>
<tr>
<th>Steps</th>
<th>Organizational chart</th>
<th>Risk identification</th>
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<tbody>
<tr>
<td>Roles and responsibilities</td>
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<td>Writing risk statements</td>
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<tr>
<td>Meeting schedule</td>
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<td>Mitigation strategies</td>
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<td>Tools and methods</td>
<td></td>
<td>Tracking data</td>
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<tr>
<td>Attribute definitions</td>
<td>timeframe, probability, impact</td>
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Definitions of Risk

Risk involves the likelihood that an undesired event will occur.

Risk involves the severity of consequence of the event should it occur.

Qualitative or Quantitative

Risk = Likelihood * Severity
Why Do Risk Management?

• Early identification of potential problems
• Enable more efficient use of resources
• Promote teamwork by involving personnel at all levels of the project
• Information for tradeoffs based on priorities and quantified assessment
• Increase chances of project success
What is Continuous Risk Management?

An engineering management practice with processes, methods, and tools for managing risks in a project.

It provides a disciplined environment for proactive decision making to:

– assess continually what could go wrong (risks)
– determine which risks are important to deal with
– implement strategies to deal with those risks
– assure, measure effectiveness of the implemented strategies
Risk Management & Project Management

Risk Management

- Schedule
- Performance
- People
- Configuration Management
- Quality
- Budget

Project Management
Where is Continuous Risk Management Applied?

- People
- Procedures
- Support Equipment
- Facilities
- Operations Environment
- Software
- Hardware

Continuous Risk Management
When Should Continuous Risk Management be Done?

System Requirements Analysis
System Design
Hardware Requirements Analysis
Hardware Design
Preliminary Design
Detailed Design
Fabrication
Testing
Hardware Development

Software Requirements Analysis
Preliminary Design
Detailed Design
Code & Debug
Integration
Testing
Software Development

System Integration & Test

Control
Identify
Track
Communicate & Document
Plan
Analyze

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Who Does Continuous Risk Management?

Everyone!

Learning Continuous Risk Management is similar to incorporating any new habit into your daily life.
Continuous Risk Management Functions

- Identify
- Analyze
- Plan
- Track
- Control
- Communicate
- Document
1 - Identify

Purpose
Search for and locate risks before they become problems

Description
The process of transforming uncertainties and issues about a project into distinct (tangible) risks that can be described and measured
A good risk statement:
Contains at least one condition
Contains at least one consequence
Is clear and concise

Good context:
Provides additional information not in the risk statement
Ensures that the original intent of the risk can be understood, particularly after time has passed
2 - Analyze

Purpose

Convert risk data into decision-making information

Description

The process of examining the risks in detail to determine the extent of the risks, how they relate to each other, and which ones are the most important
Analysis Activities

**Evaluate:**
- impact (I)
- probability (P)
- timeframe (T)

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<tr>
<th>Risk</th>
<th>I</th>
<th>P</th>
<th>T</th>
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<tr>
<td>Risk a</td>
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**Classify:**
- identify duplicates
- consolidate risks to sets

**Prioritize:**
- identify Pareto top N
- rank top N

Evaluate:
- impact (I)
- probability (P)
- timeframe (T)

Classify:
- identify duplicates
- consolidate risks to sets

Prioritize:
- identify Pareto top N
- rank top N
3 - Plan

Purpose
Translate risk information into decisions and mitigating actions (both present and future), and implement those actions

Description
The process of deciding what, if anything, should be done about a risk or set of related risks
Action Plan Approaches

- Action plans (Approaches/types)
  - Research
  - Accept
  - Watch
    - Mitigation Plan
      - Mitigate
        - Mitigation Plan
          - Task Plan
          - Action Item
          - Tracking Requirements
            - Acceptance Rationale
              - Research Plan
4 - Track

Purpose

Monitor risk indicators and mitigation actions
   Is the plan followed?
   Is the risk reduced?

Description

The process in which risk status data are acquired, compiled, and reported
Risk Metrics

Measure attributes of a risk
  impact, probability, and timeframe
  other risk-specific attributes
Assess the impact or success of a mitigation plan
Chosen during planning
Provide meaningful information to enable more informed control decisions

Triggers
  provide early warning of an impending critical event
  indicate the need to implement a contingency plan to preempt a problem
5 - Control

Purpose
To make informed, timely, and effective decisions regarding risks and their mitigation plans

Description
The process that takes the tracking status reports for the project risks and decides what to do with the risks based on the reported data
6 - Communicate & Document

Purpose

Provide information and feedback to the project on the risk activities, current risks, and emerging risks

Description

A process in which risk information is conveyed between all levels of a project team
Course Evaluations

Applicability to Work

- Directly Applicable: 64%
- Mostly Old Ideas - But Valuable: 10%
- Useful - At Least In Part: 24%
- Covered:
- No Feedback: 2%

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# RM--Costs vs. Benefits

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<tr>
<th>Costs</th>
<th>Benefits</th>
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<td>Formalized process</td>
<td>Reduced “forest fires”</td>
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<tr>
<td>Formalized documentation</td>
<td>Fewer surprises</td>
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<tr>
<td>Additional analysis</td>
<td>Clearly specified contingency plans and triggers</td>
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<td>Additional mitigation actions</td>
<td>More effective use of resources</td>
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<td>Training</td>
<td>Fewer schedule and cost overruns</td>
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<td>Greater probability of mission success</td>
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Can you really afford NOT to?
Summary

The time is right for RM;
Successfully managing “Better, Faster, Cheaper” projects requires up-front, knowledge-based RM;

Good RM is good PM;
A structured RM approach is critical to successful projects in the current environment;

RM is required (NPG 7120.5A & NPD 2820) and expected;
RMP, CRM, primary risks, PMC reviews, Independent Assessments

The NASA specific RM training is ready and available;
The SATC at GSFC is responsible for the course.

Over 30 courses have already been taught since 1/1/98 at all NASA centers.
RM concepts are being applied by projects trained in CRM.
References

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